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GRADUATE *Catalog*

NORTH CAROLINA STATE UNIVERSITY BULLETIN
RALEIGH, NORTH CAROLINA



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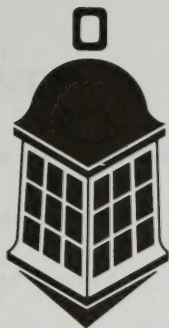
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THE

GRADUATE

SCHOOL

Graduate Catalog



North Carolina State University

Raleigh, North Carolina

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NORTH CAROLINA STATE UNIVERSITY

North Carolina State University (NC State) is a national center for research, teaching and extension. As a Land-Grant state university, it shares the distinctive characteristics of these institutions nationally--broad academic offerings, extensive public service, national and international activities, and large-scale extension and research programs.

North Carolina State University is committed to equality of educational opportunity and does not discriminate against applicants, students or employees based on race, color, national origin, religion, sex, age or handicap. Moreover, NC State is open to people of all races and actively seeks to promote racial integration by recruiting and enrolling a larger number of African-American students.

NC State's rich and varied academic program is comprised of 89 undergraduate degree programs, master's degrees in 86 fields of study, 52 doctoral degree programs and the doctor of veterinary medicine program. The University offers approximately 2,600 courses per semester.

Research activities span a broad spectrum of scientific, technological and scholarly endeavors with a budget of some \$170 million annually.

Extension offices in each of the state's 100 counties and on the Cherokee Indian reservation assist in carrying the University's teaching and research programs throughout the state. The diversity of these programs spans such fields as agriculture, design, education, engineering, forestry, humanities, management, marine and environmental sciences, textiles, veterinary medicine, and the physical, social and life sciences.

The University's annual expenditures reach approximately \$454 million, and its permanent employees total about 6,200. There are more than 3,100 faculty and professional staff, including approximately 2,000 graduate faculty. Among the many honors and recognitions received by members of the faculty are seven memberships in the National Academy of Science and five in the National Academy of Engineering, 43 named professorships, 14 distinguished university professorships and 16 Graduate Alumni Distinguished Professors.

NC State's campus, located just west of the downtown area of Raleigh, totals some 1,800 acres. This includes the central campus of 623 acres with some 166 buildings, the adjacent Centennial Campus of 1,000 acres under development, and the 182-acre College of Veterinary Medicine campus.

In addition, the University has some 88,000 acres statewide, including one research and endowment forest of 78,000 acres. Near the campus are 2,500 acres containing research farms; biology and ecology sites; genetics, horticulture and floriculture nurseries; teaching and research forests; and Carter-Finley Stadium.

With a total enrollment of more than 27,500, the University has approximately 19,200 undergraduate students, 5,100 graduate students, 3,000 lifelong education students and almost 300 in veterinary medicine. The student population consists of approximately 16,180 men and 11,350 women, including 2,630 African-Americans and almost 1,800 other minority students. Students come to NCSU from every state in the union and at least 87 foreign countries are represented by 1,161 international students.

The University is organized in nine colleges, the School of Design and the Graduate School. The nine colleges are Agriculture and Life Sciences, Education and Psychology, Engineering, Forest Resources, Humanities and Social Sciences, Management, Physical and Mathematical Sciences, Textiles and Veterinary Medicine. In addition, a complex of divisions and programs provides for a wide range of special programs in academic affairs, research and extension.

North Carolina State University is one of three Research Triangle Universities, along with Duke University and the University of North Carolina at Chapel Hill, forming the 30-mile triangle which encompasses the Research Triangle Park and includes the Research Triangle Institute, a not-for-profit, contract research organization founded by the three universities.

NC State is a member of the National Association of State Universities and Land-Grant Colleges. It is also a member of the American Council on Education, the College Entrance Examination Board, the Council of Graduate Schools, the National Commission on Accrediting and the Southern Association of Colleges and Schools.

NC State is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the associate, baccalaureate, master's and doctoral degrees. Numerous professional fields are also accredited by national accrediting agencies.

Nondiscrimination Statement

North Carolina State University is dedicated to equality of opportunity within its community. Accordingly, North Carolina State University does not practice or condone discrimination, in any form, against students, employees or applicants on the grounds of race, color, national origin, religion, sex, age or disability. North Carolina State University commits itself to positive action to secure equal opportunity regardless of those characteristics.

North Carolina State University supports the protection available to members of its community under all applicable Federal laws. For additional information, contact:

Ms. Joanne Woodard
Assistant Provost for Equal Opportunity
304-A Holladay Hall
Box 7530
North Carolina State University
Raleigh North Carolina 27695-7530
Phone:(919) 515-4559 or 515-3148

Code of Student Conduct

North Carolina State University is committed to academic integrity, and all students are required to adhere to the *NCSU Code of Student Conduct*. Graduate students may also refer to the *NCSU Graduate Student Rights and Responsibilities* document.

Additional Information

If additional information is needed, contact the Graduate School, 106 Peele Hall, P. O. Box 7102, North Carolina State University, Raleigh, N.C. 27695-7102 (telephone 919/515-2871).

ADMINISTRATION

Marye Anne Fox, *Chancellor*

Phillip J. Stiles, *Provost and Vice Chancellor*

Debra W. Stewart, *Vice Provost and Dean of Graduate School*

Charles G. Moreland, *Vice Chancellor for Research, Outreach and Extension*

George L. Worsley, *Vice Chancellor for Finance and Business*

Thomas H. Stafford Jr., *Vice Chancellor for Student Affairs*

Jeffrey P. McNeill, *Vice Chancellor for University Advancement*

Deans of Colleges and Schools

James L. Oblinger, *Dean, Agriculture and Life Sciences*

Marvin J. Malecha, *Dean, Design*

Joan J. Michael, *Dean, Education and Psychology*

Nino A. Masnari, *Dean, Engineering*

Larry W. Tombaugh, *Dean, Forest Resources*

Margaret A. Zahn, *Dean, Humanities and Social Sciences*

Richard J. Lewis, *Dean, Management*

Jerry L. Whitten, *Dean, Physical and Mathematical Sciences*

Robert A. Barnhardt, *Dean, Textiles*

Oscar J. Fletcher, *Dean, Veterinary Medicine*

Graduate School--Administrative Office

D. W. Stewart, *Dean*

R. S. Sowell, *Associate Dean*

M. F. King, *Associate Dean*

Administrative Board of the Graduate School

T e r m

Expires

D. W. Stewart, <i>Dean</i>	
R. S. Sowell, <i>Associate Dean</i>	
M. F. King, <i>Associate Dean</i>	
G. T. Barthalmus, <i>Professor of Zoology; Interim Associate Dean And Director of Academic Programs, College of Agriculture and Life Sciences</i>	June 1999
S. M. Bedair, <i>Professor of Electrical and Computer Engineering and Materials Science and Engineering</i>	December, 2001
J. G. Gilligan, <i>Professor of Nuclear Engineering; Associate Dean for Research and Graduate Programs, College of Engineering</i>	June, 1998
B. Hammerberg, <i>Professor of Microbiology, Pathology and Parasitology</i>	December, 1999
C. R. Knoeber, <i>Professor of Economics</i>	April, 2001
J. R. Kolb, <i>Professor of Mathematics, Science and Technology Education; Associate Dean for Academic Affairs, College of Education and Psychology</i>	June, 1999
C. D. Livengood, <i>Professor of Textile Engineering, Chemistry and Science; Associate Dean for Academic Programs, College of Textiles</i>	August, 1998
C. R. Miller, <i>Professor of English</i>	February, 2001
G. E. Mitchell, <i>Professor of Physics</i>	July, 2001
J. C. Park, <i>Associate Professor of Mathematics, Science and Technology Education</i>	June, 2001
C. D. Raper Jr., <i>Professor of Soil Science and Director of Graduate Programs</i>	June, 1999
D. L. Solomon, <i>Professor of Statistics; Associate Dean of Academic Affairs, College of Physical and Mathematical Sciences</i>	June, 1998
P. Tesar, <i>Professor of Architecture</i>	August, 1999
B. E. Wilson, <i>Associate Professor of Parks, Recreation and Tourism Management and Director of Graduate Programs</i>	June, 1999

THE CALENDAR

NOTE: This calendar is subject to periodic review and revision. Please check with the University Registrar to determine if changes have been made.

SPRING SEMESTER, 1998

January 5	Mon.	First day of classes
January 12	Mon.	Last day to add a course without permission of instructor
January 19	Mon.	Holiday (Martin Luther King, Jr. Day)
January 21	Wed.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to with-draw or drop a course or to change from crdit to audit with a refund or reduction. <i>(NOTE: The tuition and fees charge is based on the official number of hourse and course carried at 5:00 p.m. on this day.)</i> TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
February 9	Mon.	Academic Difficulty Reports due
February 18	Wed.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below.
March 6	Fri.	Last day to withdraw or drop a course at the without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
March 16	Mon.	Spring vacation begins at 10:20 p.m. Classes resume at 8:05 a.m.; 8:35 a.m. Centennial Campus; Registration advising for 1996 Summer Sessions and Fall Semester begins
April 3	Fri.	<i>Deadline for submission of theses or dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in May, 1998. <u>Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</u></i>
April 10	Fri.	Holiday (Good Friday)
May 1	Fri.	Last day of classes

May 4-12	Mon.-Tues.	Final examinations
May 16	Sat.	Spring Commencement

SUMMER SESSIONS, 1998

First Session

May 25	Mon.	First day of classes
May 26	Tues.	Last day to add a course without permission of instructor
May 28	Thurs.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course with a refund (<i>NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.</i>) TRACS closes at 5:00 p.m. (After this day, drops processed in 1000 Harris Hall)
June 8	Mon.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
June 9	Tues.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
June 26	Fri.	Last day of classes
June 29-30	Mon.-Tues.	Final examinations

Second Session

July 6	Mon.	First day of classes
July 7	Tues.	Last day to add a course without permission of instructor
July 9	Thurs.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course with a refund (<i>NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.</i>) TRACS closes at 5:00 p.m. (After this day, drops processed in 1000 Harris Hall)

July 10	Fri.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in August, 1998. <u>Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</u></i>
July 20	Mon.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
July 21	Tues.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
August 7	Fri.	Last day of classes
August 10-11	Mon.-Tues.	Final examinations
August 11	Tues.	Summer Graduation (no commencement program)

FALL SEMESTER, 1998

August 17	Mon.	First day of classes
August 24	Mon.	Last day to add a course without permission of instructor
August 31	Mon.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course or change from credit to audit with a refund or reduction. (NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.) TRACS closes at 5:00 p.m.(after this day, drops processed in 1000 Harris Hall)
Sept. 7	Mon.	Holiday (Labor Day)
Sept. 21	Mon.	Academic Difficulty Reports due
Sept. 28	Mon..	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
October 9	Fri.	Fall vacation begins at 10:20 p.m.
October 14	Wed.	Classes resume at 8:05 a.m.; 8:35 a.m., Centennial Campus

October 16	Fri.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
October 19	Mon.	Registration advising for 1999 Spring Semester begins
October 25	Sun.	TRACS registration opens for 1999 spring semester
November 6	Fri.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in December, 1998. <u>Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</u></i>
November 25	Wed.	Thanksgiving vacation begins at 10:20 p.m.
November 30	Mon.	Classes resume at 8:05 a.m.; 8:35 a.m. Centennial Campus
December 4	Fri.	Last day of classes
December 7-15	Mon.-Tues.	Final examinations
December 16	Wed.	Fall Graduation Exercise

SPRING SEMESTER, 1999

January 4	Mon.	First day of classes
January 11	Mon.	Last day to add a course without permission of instructor
January 18	Mon.	Holiday (Martin Luther King, Jr. Day)
January 19	Tues.	No classes.
January 20	Wed.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course or to change from credit to audit with a refund or reduction. (NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.) TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
February 1	Mon.	Academic Difficulty Reports due
February 17	Wed.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below

March 5	Fri.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
March 15	Mon.	Spring vacation begins at 10:20 p.m. Classes resume at 8:05 a.m.; 8:35 a.m., Centennial Campus. Registration advising for 1999 Summer Sessions and Fall Semester begins
March 31-Apr. 1	Wed.-Thurs.	No classes
April 1	Thurs.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in May, 1999. <u>Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</u></i>
April 2	Fri.	Holiday (Good Friday)
April 30	Fri.	Last day of classes
May 3-11	Mon.-Tues.	Final examinations
May 15	Sat.	Spring Commencement

SUMMER SESSIONS, 1999

First Session

May 17	Mon.	First day of classes
May 18	Tues.	Last day to add a course without permission of instructor
May 20	Thurs.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course with a refund. (NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.) TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
May 31	Mon.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
June 1	Tues.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level

June 18	Fri.	Last day of classes
June 21-22	Mon.-Tues.	Final examinations

Second Session

July 6	Tues.	First day of classes
July 7	Wed.	Last day to add a course without permission of instructor
July 9	Fri.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in August, 1999. <u>Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</u></i>
July 9	Fri.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course with a refund. (NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.) TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
July 20	Tues.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
July 21	Wed.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
August 9	Mon.	Last day of classes
August 10	Tues.	Reading Day
August 11-12	Wed.-Thurs.	Final examinations
August 12	Thurs.	Summer Graduation (no commencement program)

FALL SEMESTER, 1999

August 16	Mon.	First day of classes
August 23	Mon.	Last day to add a course without permission of instructor

August 30	Mon.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course or change from credit to audit with a refund or reduction. (NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.) TRACS closes at 5:00 p.m.(after this day, drops processed in 1000 Harris Hall)
Sept. 6	Mon.	Holiday (Labor Day)
Sept. 20	Mon.	Academic Difficulty Reports due
Sept. 27	Mon..	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
October 8	Fri.	Fall vacation begins at 10:20 p.m.
October 13	Wed.	Classes resume at 8:05 a.m.; 8:35 a.m., Centennial Campus
October 15	Fri.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
October 18	Mon.	Registration advising for 2000 Spring Semester begins
November 5	Fri.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in December, 1999. <u>Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</u></i>
November 24	Wed.	Thanksgiving vacation begins at 10:20 p.m.
November 29	Mon.	Classes resume at 8:05 a.m.; 8:35 a.m. Centennial Campus
December 3	Fri.	Last day of classes
December 6-14	Mon.-Tues.	Final examinations
December 15	Wed.	Fall Graduation Exercise

SPRING SEMESTER, 2000

January 10	Mon.	First day of classes
January 17	Mon.	Holiday (Martin Luther King, Jr. Day)
January 18	Tues.	No classes

January 19	Wed.	Last day to add a course without permission of instructor
January 26	Wed.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course or to change from credit to audit with a refund or reduction. (NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.) TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
February 14	Mon.	Academic Difficulty Reports due
February 23	Wed.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
March 10	Fri.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
March 20	Mon.	Spring vacation begins at 10:20 p.m. Classes resume at 8:05 a.m.; 8:35 a.m., Centennial Campus. Registration advising for 1999 Summer Sessions and Fall Semester begins
April 7	Thurs.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in May, 2000. <u>Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</u></i>
April 19-20	Wed.-Thurs.	No classes
April 21	Fri.	Holiday (Good Friday)
May 5	Fri.	Last day of classes
May 8-16	Mon.-Tues.	Final examinations
May 20	Sat.	Spring Commencement

Drop Dates for Minicourses

The drop date for a five-week minicourse is the last day of the third week of the minicourse. The drop date for a seven-week minicourse is the last day of the fourth week of the minicourse.

THE GRADUATE SCHOOL

Graduate instruction was first offered at North Carolina State University in 1893, and the first doctoral degree was conferred in 1926. In the ensuing years, the Graduate School has grown steadily and now provides instruction and facilities for advanced study and research in the fields of agriculture and life sciences, design, education, engineering, forest resources, humanities and social sciences, management, physical and mathematical sciences, textiles and veterinary medicine.

The Graduate School is currently composed of more than 2,000 graduate faculty members. Educated at major universities throughout the world and established both in advanced teaching and research, these scholars guide the University's 5,000 master's and doctoral students from all areas of the U.S. and many other countries.

The faculty and students have available exceptional facilities, including libraries, laboratories, modern equipment and special research areas. Additionally, a cooperative agreement exists among the Graduate Schools of the University of North Carolina at Chapel Hill, the University of North Carolina at Greensboro, Duke University and North Carolina State University which increases the educational and research possibilities associated with each.

University Graduate Student Association

The University Graduate Student Association (UGSA) is an academic, political and social organization comprising all graduate students. It is governed by elected officers and representatives from departmental GSA chapters. Officially recognized by the university as the voice of graduate students, it provides graduate student representation on various university committees. The UGSA president has full voting membership on the Administrative Board of the Graduate School and meets regularly with other university officials.

Some services provided by the UGSA include travel reimbursement for presenting original research at professional conferences, graduate student orientation, a teaching effectiveness workshop and outstanding TA awards, cash rebates to departmental chapters and assistance with electronic communications among NC State graduate students.

The UGSA can provide answers to questions regarding graduate student life and may be contacted via departmental representatives or the UGSA president, whose telephone number can be obtained from the Graduate School. Students may also visit the UGSA home page embedded in the Graduate School's home page on the World Wide Web. All graduate students are invited to attend the monthly meetings and become involved with the UGSA.

GENERAL INFORMATION

Application

Applications for admission must be accompanied by the following: two official transcripts from all colleges and universities previously attended, references from at least three people who know of the student's academic record and potential for graduate study, a non-refundable application fee of \$55 and, in most cases, an official statement of the student's Graduate Record Examination or other standardized test scores. Application and reference forms may be obtained by writing or visiting the Graduate School, 103 Peele Hall, Box 7102, North Carolina State University, Raleigh, N. C. 27695-7102. When completed, all application materials should be returned according to instructions. Application is made for a specific degree program and date of enrollment (see "Admission").

International Students

Students whose native language is other than English, regardless of citizenship, must submit TOEFL (Test of English as a Foreign Language) scores as evidence of ability to use English at a level of competence sufficient for graduate work. The minimum requirement for admission is a TOEFL score of 550, with scores of 50 on at least two of the sections and no section score below 45. (Minimum score subject to change; departments may establish a higher minimum requirement.) The test date must be within 24 months of the application deadline date before the semester for which the application is being reviewed. An *official* score report issued by the Educational Testing Service is required. All international students must be cleared by the Department of Foreign Languages and Literatures at the beginning of their initial semester in residence and may be required to take additional course work in English. The international applicant must also provide the University with verification that the required funds are available to support the proposed program of advanced study. Foreign nationals in the United States at the time application is made must also provide information regarding their current visa status. The University provides special forms to be used by the applicant in supplying this information.

Admission

The procedures followed in evaluating an applicant's potential for success in graduate work and the criteria used for admissions decisions vary according to programs and colleges/schools and reflect an evaluation of the applicant's potential to engage in graduate work and the capability of the individual programs to accommodate additional students. Most programs consider applications as they

arrive, while others accumulate applications and make recommendations on admission at certain times during the year. Generally, requests for admission are considered by departmental admissions committees which forward the departmental recommendations to the Dean of the Graduate School.

Students are admitted to full or provisional status in a specific degree program. Admission is granted for a specific semester or summer term. Any change in the admission date must be requested in writing and approved by the department and Graduate School. Once the requirements for that degree program have been completed, no further registration as a graduate student will be permitted unless admission to a new graduate classification has been formally approved. Students with special objectives may request admission in the "Graduate-Unclassified Status" (see next page) or register in the "Post-Baccalaureate Studies" program (see p.18) through the Division of Lifelong Education.

ADMISSION TO DEGREE PROGRAMS

Full Graduate Standing: To be considered for admission in full graduate standing, an applicant must have a baccalaureate degree from a college or university recognized as standard by a regional or general accrediting agency and must have at least a "B" average in the undergraduate major or in the latest graduate degree program.

Provisional Admission: 1. Provisional admission may be granted to applicants with bachelor's degrees from accredited institutions who lack undergraduate work considered essential for graduate study in a major field. Course work, without graduate credit, will be required to make up such deficiencies before admission to full status can be granted.

Applicants with bachelor's degrees from nonaccredited institutions may be granted provisional admission when their academic records warrant this status. Additional course work will be required of such students when deficiencies in previous training are apparent.

Full graduate standing is granted when the deficiencies responsible for the provisional status are corrected, provided the student has maintained a satisfactory academic record (3.0 Grade Point Average) on all course work taken in a graduate classification. A change from provisional status to full graduate standing is effected only upon the recommendation of the department in which the student is seeking the degree.

2. Students with bachelor's degrees from accredited institutions whose scholastic records are below the standards for admission to full graduate standing may be admitted provisionally when unavoidable, extenuating circumstances affected their

undergraduate averages or when progressive improvement in their undergraduate work warrants provisional admission. Students admitted provisionally under these circumstances will have their status changed to full graduate standing after completion of nine or more graduate credit hours following admission provided the student has maintained a GPA of at least 3.0

A graduate student is not eligible for appointment to an assistantship or fellowship while on provisional status.

MEDICAL HISTORY AND IMMUNIZATION RECORDS

All graduate students admitted to a degree program are required by State law to submit a report of medical history and immunization documentation prior to completing their initial registration. This report must document immunization against tetanus/diphtheria, measles, German measles, polio and a TB skin test. NC State students returning to Graduate School must have their medical history on file updated. The required reports should be received in the Student Health Service at least thirty days before registration. If this requirement is not met, **dismissal** from school is **mandatory** under the law.

GRADUATE-UNCLASSIFIED STATUS

The Graduate-Unclassified status is a temporary classification and students admitted to this status are not candidates for degrees. They may take courses for graduate credit but may not apply more than 10 credits earned while in this status to any program leading to an advanced degree at this institution. Unclassified graduate students are expected to meet the same admissions requirements that apply to graduate students in full standing. Any individual having an interest in applying for admission as a Graduate-Unclassified Student should correspond with the Graduate Dean describing his or her particular interests and objectives prior to making application.

Special Graduate-unclassified Status for International Student Visitors

1. International student visitors must state their educational objectives at NC State and the time expected to accomplish those objectives. The educational objective may not be to seek a graduate degree at NC State.
2. They are expected to meet the same minimum academic admission requirements that apply to graduate students in full standing.
3. They are expected to meet the same TOEFL requirements that apply to international students who are admitted to master's and doctoral programs if they plan to take courses. If they plan to register for Departmental Research 695 only, they are not required to take the TOEFL.
4. They must be recommended by the Director of Graduate Programs in the department in which they plan to take courses or do research.

5. They may be in this special admission status for a period not to exceed one year.
6. They may hold a research assistantship but may not hold a teaching assistantship.
7. They will not be eligible for tuition remission.

POST-BACCALAUREATE STUDIES (PBS)

The Post-Baccalaureate Studies (PBS) classification is designed for U. S. citizens who wish to undertake academic work beyond the baccalaureate degree but who are not currently admitted to a degree program. This classification is not open to international students with the exception of the spouse of a regularly enrolled NC State student. In special cases where students are sponsored by an agency of the U. S. government for specialized, non-degree study, approval may be given by the Graduate School for registration in the Post-Baccalaureate Studies classification. The following policies apply to students who wish to register for PBS:

1. All must have baccalaureate degrees from accredited institutions of higher education. Registration is through the Division of Lifelong Education.
2. All classes taken for credit by PBS students will be graded in the usual manner that applies for the particular course (A +/-through F or S,U). All courses taken at NC State will show on the student's transcript.
3. If the student is admitted as a graduate student, a maximum of nine hours may apply toward the minimum requirements of the degree for which the student is enrolled, including hours approved for graduate credit while classified as a senior, unclassified undergraduate or professional engineering student. The first nine hours of course work taken at the graduate level in the PBS category will be accepted toward degree requirements unless a request for some other combination of nine hours is made by the student's advisory committee and approved by the Graduate Dean.
4. Ten hours of PBS credit is allowed when one course is a 4-hour lab course.
5. The grade point average (GPA) of a graduate student who has credits in the PBS category will be based on all courses taken at the 400-800 level. However, no course taken six (6) years prior to enrollment into a program can be used to meet the requirements for a later master's degree at NC State.
6. Registration is limited to a maximum of two courses per semester. Individuals who are employed full-time should limit their PBS registrations to one course per semester.
7. The PBS classification carries with it no implication that the student will be admitted to the Graduate School in any degree classification.
8. All course work accepted for degree credit must be approved by the student's advisory committee as being germane to the program. Requests for degree credit for courses completed in the PBS classification are

considered after admission to a graduate degree program when the student's Plan of Graduate Work is filed with the Graduate School.

9. PBS students are expected to familiarize themselves with Graduate School policies and to seek further advice or clarification as needed.

EVENING DEGREE PROGRAMS

Students unable to attend day classes may complete all courses required for a graduate degree in certain areas by enrolling in late afternoon and evening classes. Some of the areas available include: adult and community college education, agricultural and extension education, counselor education, curriculum and instruction, English, history, liberal studies, management, public administration, public history and technical communication. Contact the department of interest for further information.

COLLEGE OF ENGINEERING PROFESSIONAL DEGREE PROGRAM

Professional degree students are admitted as undergraduate students, are classified as "PR" students and are subject to rules and regulations as established and administered by the Dean of the College of Engineering.

A professional degree student who is subsequently admitted to the Graduate School may, with the approval of the master's advisory committee, the major department and the Graduate School receive graduate credit for a maximum of nine hours credit for courses in which a grade of "B" or higher was received.

COOPERATING RALEIGH COLLEGES

The Cooperating Raleigh Colleges (CRC) is a voluntary organization comprised of North Carolina State University, Meredith College, Peace College, St. Augustine's College, St. Mary's College and Shaw University. Graduate programs are currently offered only at NC State and Meredith College, but the organization provides the opportunity for graduate students to enroll at either institution for a course or courses not offered on their home campus.

Any NC State graduate degree student who is enrolled in at least three graduate credit hours on the NC State campus may take a course at Meredith College during the fall or spring semester, provided that (a) the course is not taught on the NC State campus and (b) the advisory committee considers the course educationally desirable.

NC State students may not register for more than a total of two courses in any semester at Meredith, and no more than six of the required academic credits for a master's degree at NC State may be accepted from that institution. Grades from Meredith are not used in computing a student's NC State grade point average.

Under this agreement, regular tuition and fees are paid to NC State. Certain special fees may be required for specific courses at Meredith, and the student is responsible for paying these fees.

CERTIFICATE RENEWAL

Public school personnel who are primarily interested in "certification credit" may enroll in the PBS program through Adult Credit Programs and Summer Sessions without forwarding transcripts of previous work to the Graduate School. In such cases, the College of Education and Psychology will be responsible for assessing the adequacy of the applicant's qualifications for enrollment in the course(s) concerned.

Registration and Records

The Office of Registration and Records must have authorization from the Dean of the Graduate School before a graduate student in any classification will be permitted to register for classes. This authorization will be sent to the Office of Registration and Records at the time the student is notified of acceptance for graduate study. All students attending classes must be registered for credit or audit. Grade records are furnished the students at the end of each scheduled school term.

COURSE LOAD

A full-time graduate course load is 9 to 15 credits per semester (including audits) and 3-6 credits per summer session (including audits). Audits in subjects in which the student has no previous experience will be evaluated at full credit value in determining course load. Audits taken as repetition of work previously accomplished are considered at one half of their value in calculating course loads. With the single exception of foreign language audits, all audit registrations must fall within the range of maximum permissible course loads.

Foreign students on F-1 and J-1 visas are required by the Immigration and Naturalization Service to carry a full-time course of study to remain in status.

Graduate students holding assistantship appointments are restricted to 9 hours per semester if they hold an appointment of one-half time or greater and 12 hours per semester if they hold a one-quarter time appointment. With advance written permission from the Graduate School, a student may take more than the maximum semester course load during a particular semester if the total credit hours do not exceed 24 hours per year if the appointment is one-half time or 30 hours per year for a one-quarter time appointment.

FULL-TIME/PART-TIME STATUS FOR GRADUATE STUDENTS

NC State uses a uniform Schedule of Full-Time/Part-Time Status of Graduate Students for Loan Deferment, Financial Aid and Veteran's Benefits Purposes. The schedule below applies to all students who were admitted to the Graduate School before 1st Summer Session 1997 and who did not transfer to a doctoral program upon completion of the master's degree at NC State in or after 1st Summer Session 1997 is as follows:

<i>Assistantship Appointment</i>	<i>Hours Required For Full-Time Status</i>	<i>Hours Required for Half-Time Status</i>
No Assistantship	9 hrs or GR 697	3 hrs or GR 697 or GR 598 or GR 698
Fellowship	9 hrs	
1/4-time Assistantship	7 hrs	5 hrs
1/2-time Assistantship	5 hrs	5 hrs
3/4 time Assistantship	5 hrs	5hrs

Students who are admitted to the Graduate School in or after 1st Summer Session 1997 or who transfer from a master's degree to a doctoral degree upon completion of the master's degree in or after 1st Summer Session 1997 must be registered for 9 hours or more per semester (Fall and Spring) to be certified full-time for purposes of loan deferments, financial aid and veterans benefits. Students who hold an assistantship or a fellowship appointment that makes them eligible for the Graduate Student Support Plan (see pages 35-36) must register for 5 hours or more per semester to be considered full-time for these purposes after they meet the minimum credit hour requirements for the degree, complete all requirements on their Plan of Graduate Work, and meet the minimum full-time enrollment requirements specified by the Plan. Students who do not hold an assistantship or fellowship appointment that makes them eligible for the Student Support Plan must be registered for 3 hours or more to be certified as one-half time for the same purposes.

GRADING AND ACADEMIC STANDING

The Grading System

NC State University uses the following grading system:

<i>Grade</i>	<i>Grade Points/ Credit-Hour</i>
A+	4.33
A	4.00
A-	3.67

B+	3.33
B	3.00
B-	2.67
C+	2.33
C	2.00
C-	1.67
D+	1.33
D	1.00
D-	0.67
F	0.00

Also, S or U grades are given for certain courses. There are no grade points associated with S/U graded courses.

Grading of Graduate Courses

Graduate courses numbered at the 500 and 700 levels are graded A+... F, while 600- and 800-level courses are S/U graded. Typically, lecture courses are at the 500 or 700 level, while *research, seminar and individual study* types of courses are 600- or 800-level courses. Courses regularly graded A+...F may not be taken for S/U grading by graduate students.

In order to receive graduate degree credit, a grade of C- or higher is required. To graduate, a student must have a minimum 3.0 average on all graduate course work as well as all courses on the Plan of Graduate Work, including those credits earned in a PBS classification which become a part of the Plan of Graduate Work. This policy is strictly enforced. While S/U graded courses do not affect the grade point average, a student who receives a U on any course will not receive credit for that course and may be required to repeat it.

All grades on courses taken for graduate credit as an undergraduate at NC State and all grades on courses taken in a graduate classification at NC State in courses numbered 400 and above are included in the graduate grade point average. Courses at the 300 level and below are not eligible for graduate credit and subsequently do not affect the graduate GPA.

Incompletes

At the discretion of the instructor, students may be given an "IN" (Incomplete) grade for work not completed because of a serious interruption in their work not caused by their own negligence. An "IN" must not be used, however, as a substitute for an "F" when the student's performance in the course is not passing. An "IN" is only appropriate when the student's record in the course is such that the successful completion of particular assignments, projects, or tests missed as a result of a documented serious event would enable that student to pass the course. Only work missed may be averaged into the grades already recorded for that student. A student

who received an "IN" must complete the unfinished work to have the Incomplete converted to a final grade by the end of the next semester in which the student is enrolled provided that this period is not longer than 12 months from the end of the semester or summer session in which the Incomplete was received; otherwise, the "IN" will be automatically converted to "F" or "U," in accord with the grading approved for the particular course. All grades of "IN" must be cleared prior to graduation. Students must not register again for any courses in which they have "IN" grades; such registration does not remove "IN" grades, and the completion of the course on the second occasion will automatically result in an "F" for the incomplete course.

Except in the case of Interinstitutional Registration (see p. 25), grades on courses transferred from another institution will not be included in computing the grade point average.

Grade Changes

When submitted to the Department of Registration and Records, end-of-course grades are final and not subject to change by reason of a revision of the instructor's judgment nor are submitted grades to be revised on the basis of a second trial (*e.g.*, a new examination or additional work undertaken or completed). Changes may only be made within one calendar year after the date final grades were submitted in order to correct an error of computation or transcribing or where part of the student's work has been unintentionally overlooked.

Academic Warning, Probation and Termination

Graduate students are given a notice of academic warning if they have accumulated less than nine hours at the 400 level or above and have less than a 3.0 GPA. Graduate students are placed on academic probation if they accumulate nine or more but less than eighteen credit hours at the 400 level or above and have a grade point average of less than 3.0 GPA. A student's graduate study is terminated if eighteen or more credit hours at the 400 level or above are accumulated with a grade point average of less than 3.0 GPA. In the case of program termination, no further registration in a graduate classification will be permitted. Under extenuating circumstances the student will be reinstated upon the written recommendation of the department and approval by the Graduate Dean. Departments have the prerogative of recommending the termination of a student's graduate admission at any time.

Students who are eligible to attend the first summer session are eligible to attend either or both summer sessions. For example, students who receive a notice of "Graduate Admission Terminated" at the end of the first summer session may register for second summer session unless the major department recommends otherwise.

Eligibility for Assistantship, Fellowship or Traineeship

A graduate student must be in good academic standing (3.0 GPA or better average) to be eligible for appointment to an assistantship, fellowship or traineeship and must be registered in each semester in which the appointment is in effect.

CONTINUOUS REGISTRATION

After a student is admitted to the Graduate School and enrolls for the first time, she/he is required to maintain continuous registration, *i.e.*, be enrolled each semester, excluding summer sessions, until she/he has either graduated or her/his graduate program at NC State has been terminated. All students who graduate during the second summer session must be registered for either the first or second summer session. A student in good academic standing who must interrupt her/his graduate program for good reasons may request a leave of absence from graduate study for a definite period of time, normally not to exceed one year. The request should be made at least one month prior to the term involved. Upon endorsement of the request by the student's graduate advisory committee and Director of Graduate Programs, and approval by the Graduate School, the student would not be required to be registered during the leave of absence. The time that the student spends on an approved leave of absence will be included in the time allowed to complete the degree, *i.e.*, 6 years for master's and 10 for doctoral. Graduate students whose programs have been terminated because of failure to maintain continuous registration and who have not been granted a leave of absence during a fall or spring semester will be required to reapply for admission if they wish to resume their graduate studies at NC State.

SENIORS

A member of the senior class may, with prior approval of the Dean of the Graduate School, register for graduate credit in courses at the 400 through 800 levels as long as the combined graduate and undergraduate credit load is not more than 15 hours. Seniors with an accumulated grade point average of 3.2 or better in their major may enroll for a combined graduate and undergraduate credit load of 18 hours upon the recommendation of the student's advisor and approval by the department and the Graduate School. No more than six hours of graduate credit may be accumulated by a senior, and those graduate credits may not be applied toward the requirements for a baccalaureate degree. Courses at the 700 and 800 levels are not ordinarily open to undergraduates, although occasional exceptions are made for senior honor students. Seniors desiring to take courses for graduate credit should contact their major advisers who will forward appropriate requests to the Graduate Dean for approval.

AUDITS

Students wishing to audit courses must have the approval of their advisers and of the instructors teaching the courses. While auditors receive no course credit, they are expected to attend class regularly. The degree to which auditors must participate in class beyond regular attendance is optional with the instructors; any such requirements should be clearly explained to the auditors in writing at the beginning of the semester. An instructor who feels that an auditor has failed to fulfill the stipulated requirements is justified in marking "NR" (no recognition given for audit) on the grade report roll.

INTERINSTITUTIONAL REGISTRATION

NC State participates in an Interinstitutional Registration program with the University of North Carolina at Chapel Hill, the University of North Carolina at Greensboro and Duke University. Under this agreement, graduate students enrolled at NC State may undertake course work on these campuses upon the recommendation of their advisory committees. Courses offered by North Carolina A&T University and by the University of North Carolina at Charlotte over the Microelectronics Center of North Carolina communications system are also available through Interinstitutional Registration.

Even though taking a course on another campus, the graduate student is exclusively under the administrative direction of the NC State Graduate School. Enrollment for courses on other campuses will take place on this campus, using special forms obtained from the Department of Registration and Records. The Graduate School shall consider courses taken on other campuses as a part of the student's normal load, and the billing for such work will be through the NC State University Cashier's Office. During the summer the procedure is somewhat different in that a student must be enrolled in a least one course on the NC State campus during the same session as the requested interinstitutional registration.

When the grading system on the campus being visited is different from the NC State system, grades received under Interinstitutional Registration will be converted to the NC State system. "H," "P," "L" and "F" grades earned at the University of North Carolina at Chapel Hill and "E," "G," "S" and "F" grades earned at Duke University will be converted to "A," "B," "C" and "F" grades, respectively.

COOPERATIVE EDUCATION PROGRAM

The Cooperative Education Program (co-op) is designed to enhance the quality of instruction and learning by providing interested, qualified graduate students a broader understanding of their fields of study and their applicability to the world of work.

Over 500 partners in industry, business and government request graduate students for their co-op positions primarily on a full-time basis. Job offers are made by the employer based on student qualifications. Employer needs are a reflection of the labor market. Work assignments are supervised by the employer and monitored by the co-op program staff. On average, 75 graduate students are at work each semester and earn an average of over \$17 per hour. Co-op participants must enroll each term of employment at a cost of \$338 in 1998-99.

For admission to the program, students must meet the following criteria:

- ◆ Full-time enrollment at NC State immediately prior to the first work session.
- ◆ Presentation of an NC State transcript when applying for the program.
- ◆ A minimum grade point average of 3.0.
- ◆ Attendance at a co-op orientation session.
- ◆ Written approval of the graduate advisor or Director of Graduate Programs.
- ◆ An interview with the Cooperative Education Director or Coordinator.

International students must also meet visa regulations pertaining to curricular practical training. Further information is provided at orientation sessions. Call 515-4427 for a schedule.

GRADUATION

There are three official graduations for graduate students per year, occurring at the end of the fall and spring semesters and at the end of the second summer session. Formal commencement exercises are held at the end of spring and fall semesters, but any student who graduated the preceding second summer session is eligible to participate in the December commencement. Any doctoral candidate wishing to have the degree conferred *in absentia* must notify the Graduate School in writing; master's candidates should contact their departments or programs.

Diploma Order Request Cards

The diploma order request card is the form used to order a diploma for a student anticipating graduation at the end of a particular semester or second summer session. The cards are normally due to the Graduate School Office by the end of the ninth week of classes during the fall and spring semesters and by the graduation deadline noted in The Calendar for the second summer session graduation. Students graduating in the spring are awarded their diplomas during the commencement exercises. In the fall those doctoral graduates attending the commencement exercises receive their diplomas, while the diplomas for those doctoral graduates not attending the exercises and the master's graduates are mailed by the Department of Registration and Records. The diplomas for those students graduating at the end of second summer session and those not attending a formal commencement exercise are mailed by Registration and Records which is also responsible for the ordering of diplomas.

Diplomas

Students earning a Master of Arts, Master of Science, Doctor of Education or Doctor of Philosophy degree will receive diplomas designating the degree but not the program of study. Students earning master's degrees in a designated field will receive diplomas indicating the field of specialization, *i.e.*, Master of Forestry. Students with co-majors will have those identified on their transcripts but not on their diplomas.

Tuition and Fees

Tuition and fees for the 1997-98 academic year and for Summer 1998 are shown on the following page. They are subject to change each year.

A statement of tuition and fees is mailed to each preregistered student approximately five weeks before the beginning of any term. The statement must be returned with full payment or complete financial assistance information by the due date appearing on the statement. Normally the due date is approximately two weeks before classes begin. Non-preregistered students are required to pay their tuition and fees before registering.

FULL-TIME FACULTY AND EMPLOYEES

Full-time faculty of instructor rank and above and other full-time employees of the University who hold membership in the Teachers' and State Employees' Retirement System may register for credit or as auditors with free tuition privileges for one course in any academic term at any campus of the University of North Carolina. Free tuition privileges do not apply during the summer. Each applicant for free tuition must submit through regular channels a form provided by the University.

REFUND POLICY

Refunds for official withdrawals from NC State are prorated, based upon the percentage of the enrollment period attended. No refunds are made for official withdrawals after 50% of the enrollment period. The prorated withdrawal schedule will be publicized through university media after it is established.

SEMESTER RATE SCHEDULE--1997-98 ACADEMIC YEAR**(ALL RATES ARE SUBJECT TO CHANGE WITHOUT NOTICE)**

RESIDENTS OF NORTH CAROLINA*		NON-RESIDENTS**
<i>Hours</i>	<i>Tuition and Fees</i>	<i>Tuition and Fees</i>
0-Thesis	\$ 321	\$1,082
0-2	321	1,444
3-5	499	2,746
6-8	819	4,188
9	1,138	5,631

SUMMER SESSION RATE SCHEDULE--1998**RESIDENTS OF NORTH CAROLINA NON-RESIDENTS**

<i>Hours</i>	<i>Tuition and Fees</i>	<i>Tuition and Fees</i>
0-Thesis	\$208	\$ 555
1	231	694
2	294	1,072
3	357	1,450
4	420	1,828
5	483	2,206
6	546	2,584
7	609	2,962
8	672	3,340
9	732	3,718

(*For definition of resident and non-resident students for tuition purposes, see pp. 29-32.)

Audits: During semester when registered and paying for other course work: One audit free, each additional audit same cost as for credit;

During semester when not registered for other course work: Same cost as for credit;

During any summer session: Same cost as for credit.

Full-time Faculty or Staff: \$ 7

Microfilming Doctoral Dissertation: \$57

Office of International Visitors: A special administrative management fee of \$250 per semester and \$150 per summer session is required by the University's Office of International Visitors from a contracting agency sponsoring international students.

TUITION FOR STUDENTS ON ASSISTANTSHIPS AND FELLOWSHIPS

NC State implemented a new Graduate Student Support Plan in Fall 1997 that provides tuition awards for certain students who hold appointments as Graduate Teaching Assistants, Graduate Research Assistants or Graduate Fellows. Terms of and eligibility requirements for these awards are described on pages 35-36.

RESIDENCE STATUS FOR TUITION PURPOSES

The basis for determining the appropriate tuition charge rests upon whether a student is a resident or a nonresident for tuition purposes. Each student must make a statement as to the length of his or her residence in North Carolina with assessment by the institution of that statement to be conditioned by the following:

Residence--To qualify as a resident for tuition purposes, a person must become a legal resident and remain a legal resident for at least twelve months immediately prior to classification. Thus, there is a distinction between legal residence and residence for tuition purposes. Furthermore, twelve months' legal residence means more than simple abode in North Carolina. In particular, it means maintaining a domicile (permanent home of indefinite duration) as opposed to "maintaining a mere temporary residence or abode incident to enrollment in an institution of higher education." The burden of establishing facts which justify classification of a student as a resident entitled to in-state tuition rates is on the applicant for each classification, who must show his or her entitlement by the preponderance (the greater part) of the residentiary information.

Initiative--Being classified a resident for tuition purposes is contingent on the student's seeking such status and providing all information that the institution may require in making the determination.

Parents' Domicile--If an individual, irrespective of age, has living parent(s) or court-appointed guardian of the person, the domicile of such parent(s) or guardian is, prima facie, the domicile of the individual; but this prima facie evidence of the individual's domicile may or may not be sustained by other information. Further, nondomiciliary status of parents is not deemed prima facie evidence of the applicant child's status if the applicant has lived (though not necessarily legally resided) in North Carolina for the five years preceding enrollment or re-registration.

Effect of Marriage--Marriage alone does not prevent a person from becoming or continuing to be a resident for tuition purposes, nor does marriage in any circumstance insure that a person will become or continue to be a resident for tuition purposes. Marriage and the legal residence of one's spouse are, however, relevant information in determining residentiary intent. Furthermore, if both a husband and his wife are legal residents of North Carolina and if one of them has been a legal

resident longer than the other, then the longer duration may be claimed by either spouse in meeting the twelve-month requirement for in-state tuition status.

Military Personnel--A North Carolinian who serves outside the State in the armed forces does not lose North Carolina domicile simply by reason of such service. Students from the military may prove retention or establishment of residence by reference, as in other cases, to residuary acts accompanied by residuary intent.

In addition, a separate North Carolina statute affords tuition rate benefits to certain military personnel and their dependents even though not qualifying for the in-state tuition rate by reason of twelve months' legal residence in North Carolina. Members of the armed services, while stationed in and concurrently living in North Carolina, may be charged a tuition rate lower than the out-of-state tuition rate to the extent that the total of entitlements for applicable tuition costs available from the federal government, plus certain amounts based under a statutory formula upon the in-state tuition rate, is a sum less than the out-of-state tuition rate for the pertinent enrollment. A dependent relative of a service member stationed in North Carolina is eligible to be charged the in-state tuition rate while the dependent relative is living in North Carolina with the service member and if the dependent relative has met any requirement of the Selective Service System applicable to the dependent relative. These tuition benefits may be enjoyed only if the applicable requirements for admission have been met; these benefits alone do not provide the basis for receiving those derivative benefits under the provisions of the residence classification statute reviewed elsewhere in this summary.

Grace Period--If a person (1) has been a bona fide legal resident, (2) has consequently been classified a resident for tuition purposes and (3) has subsequently lost North Carolina legal residence while enrolled at a public institution of higher education, that person may continue to enjoy the in-state tuition rate for a grace period of twelve months measured from the date on which North Carolina legal residence was lost. If the twelve months end during an academic term for which the person is enrolled at a State institution of higher education, the grace period extends, in addition, to the end of that term. The fact of marriage to one who continues domiciled outside North Carolina does not by itself cause loss of legal residence, marking the beginning of the grace period.

Minors--Minors (persons under 18 years of age) usually have the domicile of their parents, but certain special cases are recognized by the residence classification statute in determining residence for tuition purposes.

(a) If a minor's parents live apart, the minor's domicile is deemed to be North Carolina for the time period(s) that either parent, as a North Carolina legal resident, may claim and does claim the minor as a tax dependent, even if other law or judicial act assigns the minor's domicile outside North Carolina. A minor thus deemed to be a legal resident will not, upon achieving majority before enrolling at an institution

of higher education, lose North Carolina legal residence if that person (1) upon becoming an adult "acts, to the extent that the person's degree of actual emancipation permits, in a manner consistent with bona fide legal residence in North Carolina" and (2) "begins enrollment at an institution of higher education not later than the fall academic term next following completion of education prerequisite to admission at such institution."

(b) If a minor has lived for five or more consecutive years with relatives (other than parents) who are domiciled in North Carolina and if the relatives have functioned during this time as if they were personal guardians, the minor will be deemed a resident for tuition purposes for an enrolled term commencing immediately after at least five years in which these circumstances have existed. If under this consideration a minor is deemed to be a resident for tuition purposes immediately prior to his or her eighteenth birthday, that person on achieving majority will be deemed a legal resident of North Carolina of at least twelve months' duration. This provision acts to confer in-state tuition status even in the face of other provisions of law to the contrary; however, a person deemed a resident of twelve months' duration pursuant to this provision continues to be a legal resident of the State only so long as he or she does not abandon North Carolina domicile.

Lost but Regained Domicile--If a student ceases enrollment at or graduates from an institution of higher education while classified a resident for tuition purposes and then both abandons and reacquires North Carolina domicile within a 12-month period, that person, if he or she continues to maintain the reacquired domicile into re-enrollment at an institution of higher education, may re-enroll at the in-state tuition rate without having to meet the usual 12-month durational requirement. However, any one person may receive the benefit of this provision only once.

Change of Status--A student admitted to initial enrollment in an institution (or permitted to re-enroll following an absence from the institutional program which involved a formal withdrawal from enrollment) must be classified by the admitting institution either as a resident or as a non-resident for tuition purposes prior to actual enrollment. A residence status classification once assigned (and finalized pursuant to any appeal properly taken) may be changed thereafter (with corresponding change in billing rates) only at intervals corresponding with the established primary divisions of the academic year.

Transfer Students--When a student transfers from one North Carolina public institution of higher education to another, he or she is treated as a new student by the institution to which he or she is transferring and must be assigned an initial residence status classification for tuition purposes.

Prevailing North Carolina Law--General Statute (G.S.) 116-143.1 is the prevailing statute governing residence status classification. A copy of the applicable law and/or implementing regulations is available for inspection in the Office of Graduate

Admissions, 103 Peele Hall. Residence-and-Tuition Status Applications are also available in the same office and questions should be directed to that office.

Financial Support for Graduate Students

Fellowships and Graduate Assistantships

Graduate students may receive financial support through fellowships, traineeships and teaching or research assistantships sponsored by federal, state and private agencies. Prospective students may request consideration for financial assistance by completing the appropriate sections of the admissions application form. Applicants for these awards should correspond directly with the department of major interest concerning the availability of awards and related information. Enrolled students should contact the major department. Prospective and enrolled graduate students are encouraged to apply for national, regional and foundation fellowships in addition to awards sponsored through the University. Information on how to apply for this type of financial assistance is available in the Graduate School or on the "Fellowship Information" page on the WorldWideWeb at www2.acs.ncsu.edu/grad/funding/fellows.htm. Enrolled or prospective students may also consult the Financial Aid Office for information on federal loan programs.

A graduate student must be in good academic standing (3.0 GPA or better average) to be eligible for appointment to an assistantship, fellowship or traineeship and must be registered in each semester in which the appointment is in effect. There are also minimum registration requirements for eligibility for tuition and health insurance benefits as stated on pages 35-36.

TEACHING, RESEARCH AND SERVICES ASSISTANTSHIPS

The University offers approximately 2,100 assistantships each year. Stipend rates for teaching and research assistantships are competitive with other universities. For further information on the availability of assistantships, applicants should contact the program area of interest. Graduate Teaching Assistants and Graduate Research Assistants may be eligible for health insurance and tuition benefits. Graduate Services Assistants do not participate in these benefits.

DEPARTMENTAL FELLOWSHIPS

Some departments or programs offer fellowships. Students are nominated for these fellowships by their departments or programs with selection being made by faculty committees or by the Graduate School. For additional information concerning such fellowships, the applicant should contact the appropriate college, department or program.

NATIONAL, REGIONAL AND FOUNDATION FELLOWSHIPS

These awards are made to an individual rather than to the University. Recipients are chosen through competitions expressive of the terms of each award. Examples of these awards held by currently enrolled graduate students follow:

National Science Foundation (NSF) Graduate Research Fellowship
Ford Foundation Predoctoral Fellowship for Minorities
Department of Defense National Defense Science and Engineering Graduate Fellowship (DOD NDSEG)
Department of Energy Computational Science Graduate Fellowship
NASA Graduate Student Researchers Program - Underrepresented Minority Focus Award
National Consortium for Graduate Degrees for Minorities in Engineering Inc. (GEM) Fellowship
National Physical Science Consortium: Graduate Fellowships for Minorities and Women in the Physical Sciences

Applications and/or information on the above fellowship programs are available in the Graduate School.

GRADUATE SCHOOL FELLOWSHIPS

The Diversity Graduate Assistance Grant is a grantsmanship program created by NC State to aid in the support of graduate students from underrepresented groups in all graduate programs of the University.

This program provides stipends on a financial need basis up to \$5,000 for the academic year. Recipients must be full-time, new or continuing students pursuing master's or doctoral degrees at NC State. Additional information and application materials are available on the WorldWideWeb at www.fis.ncsu.edu/Grad/div_prog.htm

Alumni Association Graduate Fellowship Supplements are funded by the NC State Alumni Association each year in an effort to recruit outstanding graduate students, with the highly competitive award process being coordinated through the Graduate School office. For the 1997-98 academic year twenty-six Graduate Fellowship Supplements were funded; twenty-four of these were awarded across campus, and two were awarded to support the management of University Archives. These supplements are awarded on a one-time-only basis as a financial incentive *and beyond* whatever primary fellowship or assistantship may be offered. In addition, two Alumni Association Graduate International Fellowships are awarded through the International Student Office.

Graduate Assistance in Areas of National Need: The U.S. Department of Education provides support to expedite completion of the doctoral degree for graduate students committed to a career of teaching and research in an identified area of national need. In addition to an annual stipend of up to \$15,000 depending on financial need, the program reimburses educational expenses. To date, NC State has awarded 145 fellowships to graduate students studying electronic materials, biotechnology and scientific computation. Information is available in the Graduate School.

Incentive Scholarship and Grant Program for Native Americans (ISGPNA): The General Assembly of North Carolina has provided funds for doctoral fellowships under the ISGPNA Program for a number of grants to American Indian students interested in pursuing doctoral degrees at NC State. The fellowships have a maximum value of \$4,900 annually.

To be eligible for a fellowship, interested students must be enrolled full-time and in good standing in a doctoral degree program, meet state residency requirements, have financial need and be an American Indian under the program's definition. This definition states that an eligible individual is one who maintains cultural identification as an American Indian through membership in an Indian tribe recognized by the State of North Carolina or by the federal government or through other tribal affiliation or community recognition.

The **Jerry J. Collier Scholarship** provides support to an NC State alumnus(a) who participated in a varsity sport during his/her undergraduate tenure and who is entering a graduate program at NC State. The criteria for selection include academic credentials and statement of goals and objectives. The scholarship is \$3,500 for the academic year and is renewable. Information is available in the Graduate School.

Minority Presence Grant Program: Under the Board of Governors' general Minority Presence Grant Program, African-American students may be eligible for special financial assistance if they are residents of North Carolina, enrolled full time and demonstrate financial need.

The Minority Presence Grant Program for Doctoral Study, Law and Veterinary Medicine provides stipends of up to \$4,000 for the academic year, with an option of \$500 in additional support for study in the summer sessions, for African-American residents of North Carolina who are selected to participate. Recipients must be full-time students pursuing doctoral degrees, law degrees or degrees in veterinary medicine at East Carolina University, NC State, University of North Carolina at Chapel Hill or The University of North Carolina at Greensboro. Additional information and application materials are available on the WorldWideWeb at www.fis.ncsu.edu/Grad/div_prog.htm

National Science Foundation (NSF) Graduate Research Traineeships provide support to increase the number of talented undergraduates enrolling in doctoral programs in critical and emerging areas of science, mathematics and engineering. Since 1994, NC State has been awarded 10 traineeships to support doctoral students studying either scientific computation or instructional technology for science education. In addition to an annual stipend of \$14,100, the program reimburses educational expenses. Information is available in the Graduate School.

BENEFITS ASSOCIATED WITH CERTAIN GRADUATE TEACHING ASSISTANTSHIP, RESEARCH ASSISTANTSHIP AND FELLOWSHIP APPOINTMENTS

For students who were admitted to the Graduate School before Summer I 1997 and who did not transfer to a doctoral program upon completion of the master's degree at NC State in or after Summer I 1997: All awardees are responsible for tuition payments as determined by their residence status unless payment is specifically provided for by the terms of a fellowship, traineeship, scholarship or assistantship. However, a nonresident graduate student awarded a teaching or research assistantship or a fellowship may be eligible for a reduced tuition rate comparable to the in-state rate. Health insurance will be provided for all eligible Graduate Teaching Assistants, Graduate Research Assistants and Fellows. Eligibility requirements for the health insurance benefits are a stipend of at least \$3,000 per semester and enrollment in 5 hours or more in the Fall and Spring semesters.

For students who are admitted to the Graduate School in or after Summer I 1997 or who transfer from a master's degree to a doctoral degree, upon completion of the master's degree, in or after Summer I 1997: The Graduate School implemented a new Graduate Student Support Plan in Fall 1997. Students who are appointed to graduate teaching and/or research assistantships must earn a minimum of \$3,000 per semester to be eligible for the Plan. Students who have fellowships which provide a stipend of a minimum of \$3,000 per semester are also eligible for the Plan. Students in the Plan will be provided out-of-state tuition remission (the difference between non-resident and resident tuition) and in-state tuition awards during Fall and Spring semesters for a specified maximum period of time as follows:

- Doctoral students who do not hold a master's degree - 6 semesters
- Doctoral students who do not hold a master's degree - 8 semesters
- Master's students - 4 semesters

While tuition support under the plan is limited to the number of semesters stated above and to Fall and Spring semesters, departments or professors may provide tuition support for longer periods of time and during summer sessions.

Students in the plan will also be provided health insurance coverage as long as they maintain their eligibility for the plan. There is no limit on the number of semesters that eligible students will receive health insurance benefits.

Students who receive in-state tuition awards, out-of-state tuition remission or health insurance will also be subject to minimum number of semesters of full-time enrollment, *i.e.*, 9 hours per semester, for the following periods of time and 5 hours per semester thereafter:

Master's students - 4 semesters

Doctoral students who do not hold a master's degree - 6 semesters

Doctoral students who do not hold a master's degree - 8 semesters

Conditions of these benefits: If a student has been granted out-of-state tuition remission and/or in-state tuition awards but then terminates his or her program or goes off of the assistantship which provided him or her with entitlement to out-of-state tuition remission or in-state tuition awards during the semester, that student will be billed by the University Cashier's Office for the remainder of the tuition due that semester.

Other Financial Aid

LONG-TERM LOANS

Graduate students who are American citizens or eligible noncitizens may apply for long-term, low interest loans through the Office of Financial Aid. To qualify for loans, students must be making satisfactory academic progress towards a degree and must complete the appropriate application materials to demonstrate that all federal eligibility requirements for loan consideration have been met. The *Free Application for Federal Student Aid* is the form required to document eligibility for federal loan assistance. In addition, students must complete the university's *Institutional Application*. Although students are expected to apply for and to accept any available assistantships or fellowships provided by the Graduate School, it is recommended that students not wait for these decisions to be made before applying for financial aid through the Office of Financial Aid. If graduate assistantships or fellowships are offered, and borrowing no longer becomes necessary, students have the option to cancel their requests for loan assistance at any point.

Federal Stafford Loans (Subsidized and Unsubsidized): Funding for these loans is provided by private lenders. Since they are partially supported by the federal government, however, students must follow federal guidelines in applying for aid to qualify. Information on specific application procedures, loan maximums, interest rates and participating lenders may be obtained from the Office of Financial Aid. Students who apply for these loans and demonstrate need by federal definition

qualify for Federal Subsidized Stafford Loans, meaning that the federal government pays the interest on the loan while the student is enrolled on at least a half-time basis. If no need is demonstrated, students may still borrow to meet the cost of education (minus other resources, such as scholarships, fellowships and tuition remissions) through the Federal Unsubsidized Stafford Loan Program. Students who receive unsubsidized loans are charged interest while enrolled, although they may elect to capitalize interest payments to repay with principal upon completion of degree. For both subsidized and unsubsidized loans, repayment of principal is deferred until completion of the degree or until termination of at least half-time enrollment status.

Other Loan Options: Because of limited institutional funds, graduate students generally are expected to apply for the maximum Federal Subsidized and Unsubsidized Stafford Loans for which they are eligible if funding is needed to assist with educational expenses. Students who need to borrow more than the maximum amounts possible through those loan programs (the combined annual maximum is \$18,500) will be considered for other loan funds administered by the Office of Financial Aid if sufficient funding is available.

WORK-STUDY JOBS

The *Federal Work-Study Program* is a federal program designed to provide part-time jobs to students who apply for financial aid using the *Free Application for Federal Student Aid* and who document need by federal guidelines. Effort is made to assign students to jobs with their special interests and skills. Most of the jobs are on-campus, but limited opportunities for off-campus employment in community service areas are also available.

PART-TIME JOBS

Other jobs not based on need are posted under Student Employment on NC State's home page and are displayed on a bulletin board outside of the Office of Financial Aid. These jobs are open to all students.

SHORT-TERM EMERGENCY LOANS

Loans, usually in amounts of \$100 or less, to meet emergency expenses may be obtained on short notice (generally on the day of application) at the Financial Aid Office. These loans, in that they are designed for short-term, emergency use, must be repaid within about 30 days. A loan may not be taken out between semesters or between summer sessions.

Military Education and Training

The Reserve Officer Training Corps (ROTC) selects interested University students for enrollment in Army ROTC (AROTC) or in Air Force ROTC (AFROTC) for officer education and training leading toward a commission.

The Army and Air Force ROTC departments educate and train University students, graduate and undergraduate, for a commission in their respective military services. These students must have four full semesters (undergraduate or graduate) remaining at the time they enter the ROTC Program (exceptions for Army ROTC are noted below). Uniforms and books for ROTC are provided. Transfer credit is allowed for previous ROTC course work at other institutions.

Graduate students who will be at NC State for at least two years may, upon successful completion of a six-weeks' summer leadership training period, be enrolled in the ROTC Program. Entry requirements for the AROTC program may also be met by having met any *one* of the following requirements:

1. Completed basic level ROTC courses as an undergraduate.
2. Be an honorably discharged veteran.
3. Have completed military basic training and be a member of a Reserve Component Unit of any branch of the Armed Forces or National Guard.

Air Force ROTC offers a Flight Screening Program for selected cadets which is conducted by an Air Force flying school in Texas during the summer at no expense to the student. Students successfully completing ROTC flight screening may be selected for further flight training as an Air Force pilot.

Graduate students enrolled in the junior and senior years of ROTC receive \$150 per month. Scholarships which pay tuition, fees and costs of some required textbooks in addition to the \$150 per month are available on a competitive basis.

Special provisions for veterans are made in Army ROTC whereby they are granted placement credit for their prior service experience and training. Additionally, Army ROTC offers the student several points of entry into the ROTC Program, through ROTC placement credit for college courses or other worthwhile experiences that contribute to the requisite skills of a second lieutenant. Army ROTC counselors are available to evaluate the students' prior learning experiences and advise them as to where they can be placed in ROTC. Under the Army's Simultaneous Membership Program, the graduate student may participate in the Army Reserve or National Guard and receive approximately \$151 per month in addition to the \$150 monthly stipend. The National Guard provides up to \$1,000 tuition costs per year for its members.

Additional information on Army ROTC may be obtained from the Professor of Military Science, Room 154, Reynolds Coliseum (515-2428) and Air Force ROTC from the Professor of Aerospace Studies, Room 145, Reynolds Coliseum (515-2417).

Health Services

The Student Health Service, located in Clark Hall, offers health care to students in a campus facility staffed by seven full-time physicians, five Nurse Practitioners, a pharmacist, laboratory technicians, registered nurses, health educators and support staff.

During fall and spring semester, the Health Service is open 8:00 a.m. to 11:00 p.m. Monday-Friday and 8:00 a.m.-12:00 noon weekends (except during holidays and breaks). Appointments are needed to see a health care provider and may be made in person at the Health Service or by calling 515-7107 (8:00 a.m.-4:45 p.m.). Gynecology appointments are made at 515-7762. Urgent medical problems will be seen at the clinic without appointment. Physicians maintain office hours Monday through Friday, 8:00 a.m.-5:00 p.m. During summer sessions, Student Health Service is open Monday-Friday, 8:00 a.m.-5:00 p.m.

All currently enrolled students are eligible for medical care. The pre-paid health fee covers professional services such as nurse and M.D. visits, laboratory tests, cold medications and health education. There is a nominal charge for x-rays, prescriptions and specialty clinics. Students are responsible for all services received off-campus, *e.g.*, off-campus M.D., hospital or lab/x-ray.

HEALTH INSURANCE

NCSU strongly encourages each student to have accident and sickness insurance protection, either under the Graduate School Support Plan (as described on pages 35-36), the NC State Student Plan or by their parents' group policy. The policy offered by the University helps cover the cost of referrals to off-campus specialists or to hospitals for serious illnesses. For your protection, do not be uninsured! International students are **required** to have health insurance.

A brochure describing the NC State student plan is mailed to all students in July. Call (919) 515-2563 for additional information.

Housing

OFF-CAMPUS HOUSING

The Housing Assignments Office maintains listings of off-campus housing accommodations provided by private landlords and students seeking roommates; however, arrangements for off-campus housing must be made by students seeking accommodations. The listings change frequently, and most landlords and tenants prefer to complete the rental transaction in person rather than by telephone or mail. The Housing Assignments Office, 1112 Pullen Hall, is open from 7:30 a.m. until 5:00 p.m., Monday through Friday.

EDWARD S. KING VILLAGE

The University also maintains 295 apartments in E. S. King Village for students with families, for single parents and graduate students. Rental rates are far below market value. Specific rates for studio, one- and two-bedroom apartments) can be obtained by calling (919) 515-2430. The E. S. King fax number is (919) 515-7613. E. S. King Home Page resides at <http://www2.ncsu.edu/ncsu/housing/eskv/eskv.html> on the Internet.

ON-CAMPUS HOUSING

The University furnishes housing for approximately 7,100 students. The residence halls are grouped in three areas: East, Central and West Campus. Each of the areas provides laundry facilities, convenience stores, computer labs, grassy areas for sports and more.

The 1998-99 rental fee for a basic residence hall double room is \$1,045 per student per semester (the premium hall rate is \$1,360 per student per semester), subject to change on an annual basis. For more information about amenities and/or availability, call the Housing Assignments Office at (919) 831-3542. The University Housing fax number is (919) 515-3542. The University Housing home page resides at <http://www2.ncsu.edu/ncsu/housing> on the Internet.

GRADUATE PROGRAMS

The Graduate School offers programs of study leading to the master's degree in 91 fields and the doctorate in 54. Each student's program is planned with an advisory committee of graduate faculty members to provide the opportunity for gaining advanced knowledge in the particular field of study. Graduate education is the final stage in the development of intellectual independence. It is different from undergraduate education in that the student is encouraged to establish premises, to hypothesize and to defend both the procedure and the conclusions of independent investigation. The burden of proof for the verifiability of knowledge rests on the student, not on the faculty member. Emphasis is placed upon the student's scholarly development through formal course work, seminars, research and independent investigation.

Graduate students are expected to familiarize themselves with the requirements for the degrees for which they are candidates and are held responsible for the fulfillment of these requirements.

Master's Degrees

The Graduate School offers programs of study leading to the Master of Science degree, the Master of Arts degree and the Master's degree in certain designated fields.

MASTER OF SCIENCE AND MASTER OF ARTS

For all Master of Science and Master of Arts degrees, the programs are planned with the objective of making possible a reasonable, comprehensive mastery of the subject matter in a chosen field. In most cases, the Master of Science and Master of Arts programs provide training and experience in research in order to familiarize the student with the methods, ideals and goals of independent investigation. In these cases, representative of most Master of Science and Master of Arts degree programs, a thesis is required. A small number of Master of Science and Master of Arts programs do not require a thesis.

MASTER'S DEGREE IN A DESIGNATED FIELD

A number of departments and programs offer master's degrees in designated fields. These are professional degrees and do not require a thesis.

REQUIREMENTS FOR MASTER'S DEGREES

All departments and programs offering master's degrees may choose to offer the degree as an "Option B" program which has a different set of requirements from regular master's programs. A small number of departments and programs have chosen Option B. These programs will be identified in the section of this catalog titled "Fields of Instruction." Differences between the requirements of regular programs vs. Option B programs, where appropriate, are identified below.

GRADUATE ADVISOR AND GRADUATE ADVISORY COMMITTEE

All students in master's programs must have a graduate advisor who is a member of the Graduate Faculty in the student's major department or program. The graduate advisor is appointed by the Director of Graduate Programs. In addition, all students, except those in Option B programs, must have a graduate advisory committee. The advisory committee is composed of at least three members of the Graduate Faculty. The graduate advisor serves as chair or co-chair of the committee. If the student has a minor, then one of the committee members must be from the minor department or program. The graduate advisory committee is appointed by the Director of Graduate Programs in the student's department or program. At the time of the request for a permit to schedule the final oral examination, the Graduate School verifies that the committee is constituted properly.

PLAN OF GRADUATE WORK

The student's program of study is planned so as to provide a comprehensive view of the major field of interest and in related areas of knowledge, sometime constituting a minor. As great a latitude is permitted in the selection of courses as is compatible with the well-defined major and, in many cases, supporting courses or a minor. In general, it is expected that at least two-thirds of the credits will be in the major. If there are credits in a minor or supporting areas, they normally would not exceed one-third of the total. Since there are many possible combinations of course work, a specific Plan of Graduate Work is developed by the advisory committee with the student. The course work to be taken by the student and the thesis topic, where applicable, must be approved by the student's advisory committee and the Director of Graduate Programs in the student's department or program. This should be done prior to completion of one-half of the credits on the plan.

CREDITS

A minimum of 30 semester credit hours is required for all master's degrees; however, many programs require more than thirty. Also, many students, in order to gain the breadth desired in their program or to make up deficits in their

undergraduate degree, will actually take more credit hours than the minimum required by the program. At least 20 semester hours must come from 500- and 600-level courses. No more than two credit hours of departmental seminar may be included in the minimum 30-credit program. Programs that require a thesis may include no more than six hours of research credit (699) in the minimum 30- credit-hour program. Research credit is not appropriate in the non-thesis programs. Non-thesis programs may include no more than six hours of independent study credits in the minimum 30-credit program. Courses at the 400 level counted toward the minimal 30-hour requirement may not come from the major field.

Transfer credit: No more than six of the minimal 30-hour requirement will be accepted from other institutions. A graduate course which has been completed with a grade of "B" or better may be considered for transfer to a master's program provided that it has been completed in a graduate or post-baccalaureate classification at an accredited graduate school. Exceptions are allowed for transfer from foreign institutions if the department or program provides the Graduate School with adequate documentation that the course is relevant to the degree with appropriate content and level of instruction resulting in student competencies at least comparable to those of students taking the equivalent course at NC State and that the course was taught by faculty who are qualified to teach at the master's degree level. Transfer credit may not be used to fill the 20-hour 500- and 600-level requirement. Credit accepted by extension reduces the amount of credit that may be transferred from other institutions.

Transfer of Undergraduate Credit: Graduate credit may be allowed for up to 6 hours of the minimal 30-hour requirement for courses taken at NC State provided that it is at the 400 level or higher, that the grade is "B" or better, that it was not counted to fulfill undergraduate requirements, and that it is recommended by the student's undergraduate advisor prior to enrollment in the course. No graduate credit will be allowed for excess credits completed in an undergraduate classification at another institution.

Credit by Extension: A maximum of six semester credits taken prior to admission to a graduate program and earned through NC State extension study may be applied toward the minimal 30-hour requirement provided that the courses are graduate-level and taught by members of the NC State Graduate Faculty. If a student has been admitted to the Graduate School, six additional semester credits earned through NC State extension study may be used to meet the minimal 30-hour requirement. No graduate credit will be allowed for courses completed by extension at universities other than NC State. Credit accepted by extension reduces the amount of credit that may be transferred from other institutions.

Credit by Examination: Credit by examination in graduate courses may be awarded for up to six credit hours. Passage of the examination entitles the student to credit only for the course; letter grades are not allowed for credit by examination. Credit by examination may not be obtained for research, seminars, project courses or audits. Residency requirements are not fulfilled by courses in which credit is awarded by examination. Credit by examination is permitted when all of the following conditions exist: a course required on the Plan of Graduate Work is not taught within time periods indicated by the Graduate Catalog or in time periods limited by agreements with outside agencies; the student requesting the examination has not previously registered for the course, either for credit or audit; the academic standards for credit by examination are commensurate with the academic standards for the course; the examination for credit is approved by the Director of Graduate Programs and the examination is prepared by and supervised by appropriate faculty; credit is to be given only when the performance is judged to be equivalent to a "B" grade or higher; only one examination for credit is to be permitted for the same course; the request for credit by examination is approved by the Graduate School.

Credits from Previous NCSU Master's Degree: Only six credits from a previous NC State master's degree may be counted toward the minimal 30-hour requirement.

Second Master's in the Same Field: The Graduate School will not admit or transfer a student to a master's program if he/she holds a master's degree in the same discipline without a statement of justification by the student's Director of Graduate Programs.

MINOR

The Graduate School does not require a minor; however, individual departments and programs may require a minor. All students, except those in Option B programs, have the option of selecting a minor. In most cases, the minor will be in a single department or program. In some cases, an interdisciplinary minor, consisting of related credits from more than one department or program, will be selected. When a student does select a minor, the minor credits on the Plan of Graduate Work must be approved by the graduate advisory committee member, and, in some cases, the Director of Graduate Programs, from the minor department or program.

CO-MAJOR

Students may co-major at the master's level with the approval of both departments and/or programs and appropriate representation on the advisory committee. Co-majors must be within the same degree area, *i.e.*, Master of Science and Master of Science, Master of Arts and Master of Arts, Master's degree in a designated field and Master's degree in a designated field. Co-majors must meet all requirements of

both departments and/or programs. On degree is awarded, and the co-major is noted on the transcript. Enrolled co-majors will be classified in one program for record purposes.

LANGUAGE REQUIREMENTS

A reading knowledge of one foreign language (Germanic, Romance or Slavic) is required by some programs for the Master of Arts and the Master of Science degrees. Other departments may designate that the language requirement be filled from among those languages in which the Department of Foreign Languages and Literatures conducts testing. Students should contact the major department for specific language requirements.

Proficiency can be demonstrated in one of two ways:

1. By passing a traditional reading knowledge examination, which can be requested by the student at any time from the Department of Foreign Languages and Literatures.
2. By passing the final examination in a course especially designed for graduate students who have no previous knowledge of a foreign language or who wish to refresh their knowledge of a language. The Department of Foreign Languages and Literatures offers such courses, normally in the fall, for each of the three major foreign languages: French (FLF 401), German (FLG 401) and Spanish (FLS 401). These courses concentrate exclusively on teaching students to understand the written word and do not provide instruction or testing in speaking and original composition. Failure to pass the course carries with it no penalty other than the fact that the student's language requirement will remain unfulfilled. These courses are neither counted for credit nor used in computing the grade point average.

THESIS

Theses prepared by candidates for the Master of Science and Master of Arts degrees, in programs requiring the thesis, must present an original investigation into a subject which has been approved by the student's advisory committee and the Director of Graduate Programs in the student's major. Three copies of the thesis in final form as approved by the advisory committee, each signed by the members of the advisory committee, must be submitted to the Graduate School by a specific deadline in the semester or summer session in which the degree is to be conferred. Detailed information on the form and organization of the thesis is presented in the Graduate School's *Thesis and Dissertation Guide* which is available at the NC State Bookstores.

COMPREHENSIVE WRITTEN EXAMINATIONS

Written examinations covering the subject matter of the major and supporting fields and/or the minor may be required. When required, such examinations must be successfully completed prior to requesting a permit to schedule the comprehensive final oral examination. Information concerning written examination schedules should be obtained from the student's department or program.

COMPREHENSIVE FINAL ORAL EXAMINATIONS

Candidates for master's degrees, except those in Option B programs, must pass a comprehensive oral examination to demonstrate to the advisory committee that he/she possesses a reasonable mastery of the subject matter of the major and supporting fields and that this knowledge can be used with promptness and accuracy. This examination may not be held until all other requirements, except completion of the course work in current registration during the final semester, are satisfied. A request for a permit to schedule the examination may be filed with the Dean of the Graduate School after the above conditions are met. The Graduate School will check to determine that the advisory committee and the courses taken by the student meet Graduate School requirements. If all requirements are met, the permit to schedule the final examination will be forwarded to the Director of Graduate Programs within 20 days of receipt of the request. Upon receipt of the permit, the student may proceed to schedule the exam at a time that is convenient to all members of the advisory committee. In those programs which require the thesis, the thesis must be submitted in complete form, except for such revisions which may be necessary as a result of the final exam, to all members of the advisory committee at least two weeks prior to the exam.

A unanimous vote of approval of the advisory committee is required for passing the oral examination. Approval of the examination may be conditioned, however, upon completion of additional work to the satisfaction of the advisory committee. A formal reexamination will not be required in this case. Failure of a student to pass the oral examination terminates the student's graduate work at NC State unless the graduate advisory committee unanimously recommends a reexamination. Only one reexamination will be given. A form giving the date that the exam was conducted and the result of the examination and signed by all members of the advisory committee is forwarded to the Dean of the Graduate School by the Director of Graduate programs in the student's department or program. A student may appeal all committee actions by written application to the Dean of the Graduate School.

Oral examinations for master's degree candidates are open to the Graduate Faculty by right and to the University community by unanimous consent of the advisory

committee and the student being examined. Discussions and decisions regarding the student's performance are private to the advisory committee.

Students in Option B master's programs are not required to take a final oral examination.

RESIDENCE

Students engaged in a course of study leading to the master's degree are required to be in residence, pursuing graduate work, for a minimum of one full academic year or its equivalent.

TIME LIMIT

All requirements for the master's degree must be completed within six calendar years, beginning with the date that the student registers for courses carrying graduate credit applicable to the degree program, unless a more restrictive time limit has been established by the student's department or program or his/her college or school.

Summary of Procedures for Master's Degrees

ALL STUDENTS

- ◆ Application materials and required fees received.
- ◆ Application materials reviewed by department or programs.
- ◆ Department or program forwards recommendation regarding applicant's admissibility to the Graduate Dean.
- ◆ The Graduate School reviews the recommendation and the student is notified of the action taken on the request for admission.
- ◆ Student arrives, reports to the department or program, is assigned a graduate advisor and develops a roster of courses and credits with the advisor.
- ◆ Student complies with requests from Graduate School for updates copies of transcripts from previous colleges or universities.
- ◆ Student signs patent agreement and files with Graduate School.
- ◆ Student subject to continuous registration policy until graduation.
- ◆ Student passes language examination, if required.
- ◆ Student passes written examination, if required.
- ◆ Student submits diploma order form by end of sixth week of the semester or summer session of anticipated graduation.
- ◆ A grade point average of at least 3.00 for the degree requirements as well as on overall graduate course work at NCSU is required for graduation.

- ◆ All degree requirements must be completed within six calendar years, beginning with the date the student commences courses carrying graduate credit applicable to the degree program, unless a more restrictive time limit has been established by the department/program or academic college/school.

STUDENTS IN OPTION B PROGRAMS

- ◆ Plan of Graduate Work prepared by the student, in consultation with and with the approval of his/her graduate advisor and approved by Director of Graduate Programs prior to completion of one-half the credits on the plan.
- ◆ Director of Graduate Programs submits requests for graduation checkout to the Graduate Dean no later than 30 working days after the first day of the semester (seven working days after the first day of the summer session) in which the student is taking the last course on his/her Plan of Graduate Work and anticipates graduation.

STUDENTS IN NON-THESIS PROGRAMS

- ◆ Graduate advisory committee of three or more Graduate Faculty members is appointed by the Director of Graduate Programs.
- ◆ Plan of Graduate Work prepared by the student, in consultation with and with the approval of his/her graduate advisory committee and approved by the Director of Graduate Programs prior to completion of one-half the credits on the plan.
- ◆ When all requirements except completion of the course work in the final semester are satisfied, Director of Graduate Programs requests that the Graduate School issue permit to schedule the final oral examination.
- ◆ If Graduate School requirements are met, a permit to schedule the final examination is issued by the Graduate School within 20 working days of receipt of the request.
- ◆ Final examination is scheduled and conducted.
- ◆ Final examination report, including date and result of the examination, submitted to the Graduate School by the Director of Graduate Programs. Report should be received by the Graduate School within five working days of the examination.
- ◆ The deadline date for unconditionally passing the final examination in order for the student to graduate in a given semester or summer session appears in The Calendar in this catalog as well as other Graduate School calendars.

STUDENTS IN THESIS PROGRAMS

- ◆ Graduate advisory committee of three or more Graduate Faculty members is appointed by the Director of Graduate Programs.
- ◆ Plan of Graduate Work prepared by the student, in consultation with and with the approval of his/her graduate advisory committee and approved by the Director of Graduate Programs prior to completion of one-half the credits on the plan.
- ◆ A copy of a preliminary draft of the thesis, if required, is submitted to the chair of the student's advisory committee.
- ◆ When all requirements except completion of the course work in the final semester are satisfied and after the thesis is complete except for such revisions as may be necessary as a result of the exam, the Director of Graduate Programs requests that the Graduate School issue permit to schedule the final oral examination.
- ◆ If Graduate School requirements are met, a permit to schedule the final examination is issued by the Graduate School within 20 working days of receipt of the request.
- ◆ At least two weeks prior to the final oral examination, the chair of the student's advisory committee submits the thesis, if required, to the other members of the advisory committee for review.
- ◆ Final examination is scheduled and conducted.
- ◆ Final examination report, including date and result of the examination, submitted to the Graduate School by the Director of Graduate Programs. Report should be received by the Graduate School within five working days of the examination.
- ◆ Student submits three copies of the thesis, signed by each member of his/her advisory committee, to the Graduate School.
- ◆ The deadline date for submitting three copies of the thesis to the Graduate School in order for the student to graduate in a given semester or summer session appears in The Calendar in this catalog as well as other Graduate School calendars.
- ◆ The thesis is reviewed by the Graduate School to insure that the format conforms with the specifications prescribed in the *Thesis and Dissertation Guide*.

Doctor of Philosophy and Doctor of Education Degrees

The doctorate symbolizes the ability of the recipient to undertake original research and scholarly work at the highest levels without supervision. The degree is therefore not granted simply upon completion of a stated amount of course work but rather upon demonstration by the student of a comprehensive knowledge and high attainment in scholarship in a specialized field of study. The student must demonstrate this ability by writing a dissertation reporting the results of an original investigation and by passing a series of comprehensive examinations in the field of specialization and related areas of knowledge.

ADVISORY COMMITTEE AND PLAN OF GRADUATE WORK

An advisory committee of at least four graduate faculty members, one of whom will be designated as chair, will be appointed by the Dean of the Graduate School upon the recommendation of the director of graduate programs of the major department. The committee, which must include at least one representative of the minor field, will, with the student, prepare a Plan of Graduate Work which must be approved by the director of graduate programs of the major department and the Graduate School. In addition to the course work to be undertaken, the subject of the student's dissertation must appear on the plan; and any subsequent changes in committee or subject or in the overall plan must be submitted for approval.

The program of work must be unified, and all constituent parts must contribute to an organized program of study and research. Courses must be selected from groups embracing one principal subject of concentration, the major, and, when appropriate, from a cognate field, the minor. Normally, a student will select the minor work from a single discipline or field which, in the judgment of the advisory committee, provides relevant support to the major field. However, when the advisory committee finds that the needs of the student will best be served by work in an interdisciplinary minor, it has the alternative of developing a special set of courses in lieu of the usual minor.

CO-MAJOR

Students may co-major at the doctoral level with the approval of both departments and the appointment of a co-chair from each department on the advisory committee. Co-majors must meet all requirements for majors in both departments. One degree is awarded and the co-major is noted on the transcript. Co-majors are not permitted between Doctor of Philosophy and Doctor of Education degree programs. Enrolled co-majors will be classified in only one program for record purposes.

RESIDENCE REQUIREMENT

For the Doctor of Philosophy and the Doctor of Education degrees, the student is expected to be registered for graduate work at an accredited graduate school for at least six semesters beyond the baccalaureate degree.

The basic University residence requirements are defined below. However, academic colleges/schools have the prerogative of establishing more restrictive requirements within the respective schools. (The College of Education and Psychology requires a minimum of one academic year of full-time resident study).

At least two residence credits, as defined below, must be secured in continuous residence (registration in consecutive semesters) as a graduate student at the University. Failure to take work during the summer does not break continuity; however, summer work may be used in partial fulfillment of this requirement.

Residence credit is determined by the number of semester hours of graduate work carried during a given term. During a regular semester, residence credit is calculated in the following manner:

<i>Semester Credits (Hours)</i>	<i>Residence Credits</i>
9 or more	1
6-8	2/3
less than 6 (including registration for "DR" Dissertation Preparation" or "Disserta- tion Research")	1/3

The residence credit for a six-week summer term is equal to one-half of the corresponding amount for a regular semester. For example, six semester hours carried during a summer session will earn one-third of a residence credit; less than six credit hours will earn one-sixth of a residence credit.

LANGUAGE REQUIREMENTS

A reading knowledge of at least one modern foreign language (Romance, Germanic or Slavic) is required by some departments for the Doctor of Philosophy degree. Other departments may designate that the language requirement be filled from among those languages in which the Department of Foreign Languages and Literatures conducts testing. Doctoral students should contact the major department for specific language requirements. For the Doctor of Education degree, the decision as to whether or not there will be a language requirement is left to the student's advisory committee.

The Department of Foreign Languages and Literatures offers courses in French, German and Spanish especially designed for graduate students who have no previous knowledge of a foreign language or who wish to refresh their knowledge of a language. These courses concentrate exclusively on teaching students to understand the written word and do not provide instruction or testing in speaking and original composition. A passing grade on the final examination in one of these courses is sufficient evidence of a reading knowledge of the language.

To demonstrate comprehension in depth of one language, a student must not only prove that one possesses a reading knowledge of the language but also that he or she is proficient in the oral and compositional elements of that language. Students desiring to master one language in depth should consult the head of the Department of Foreign Languages and Literatures concerning the specific courses which will be necessary to achieve this comprehension; specific arrangements will depend upon the student's background in the language.

Students whose native language is other than English may use English as one of the languages when two are required for the Doctor of Philosophy degree. When English is submitted in partial fulfillment of the dual language requirement, the native language may not be used as the other language.

When only one language is required in the student's program, certification for that language must occur on this campus.

PRELIMINARY COMPREHENSIVE EXAMINATIONS

After completing the language requirement but not earlier than the end of the second year of graduate study and not later than one semester (four months) before the final oral examination, each doctoral student is required to take the preliminary comprehensive examinations. The examinations consist of two parts: written examinations and an oral examination. Requirements for written examinations in the minor field are left to the discretion of the department in which the student is minoring.

The written portion may be conducted in one of two ways. In the first, each member of the advisory committee prepares a set of questions for the student's response, and answers to each set are returned to the appropriate member for grading. This procedure is used by departments which have a relatively small number of doctoral students.

Many of the larger departments have developed departmental written examinations to be used for all students, and scheduled dates are announced well in advance. Where written departmental examinations of this kind are used, the student will be

expected to make arrangements to schedule these examinations. Regardless of the method employed, the questions involved may cover any phase of the course work taken by the student during graduate study or any subject logically related to an understanding of the subject matter in the major and minor areas of study. The questions are designed to measure the student's mastery of the subject matter and the adequacy of preparation for research. Failure to pass the written preliminary examinations terminates the student's work at this institution, subject to departmental and/or school policies with respect to reexamination.

Upon satisfactory completion of the written portion of the preliminary examinations and after completion of all course work relevant to the examination, authorization for the preliminary oral examination is requested from the Graduate School. This examination is conducted by the student's advisory committee and a representative from the Graduate School and is open to all graduate faculty members. The student and the examining committee will be notified by the Graduate School of the arranged time and place. The oral examination is designed to test the student's ability to relate factual knowledge to specific circumstances, to use this knowledge with accuracy and promptness and to demonstrate a comprehensive understanding of the field of specialization and related areas.

A unanimous vote of approval by the members of the advisory committee is required for the student to pass the preliminary oral examination. Approval may be conditioned, however, on the successful completion of additional work in some particular field(s). All committee actions may be appealed by written application to the Graduate Dean.

Failure to pass the preliminary oral examination terminates the student's work at this institution unless the examining committee recommends a reexamination. No reexamination may be given until at least one full semester has elapsed, and only one reexamination is permitted.

CANDIDACY

A doctoral student is admitted to candidacy upon passing the preliminary examinations without conditions or after fulfilling any conditions specified by the advisory committee.

FINAL ORAL EXAMINATION

The final oral examination is scheduled after the dissertation is complete except for such revisions as may be necessary as a result of the examination, but not earlier than one semester or its equivalent after admission to candidacy and not before all required course work has been completed or is currently in progress. The

examination consists of the candidate's defense of the methodology used and the conclusions reached in the research, as reported in the dissertation. It is conducted by an examining committee, which consists of the student's advisory committee and a Graduate School representative. This examination is open to the University community.

A unanimous vote of approval of the advisory committee is required for passing the final oral examination. Approval may be conditioned, however, on the student's meeting specific requirements prescribed by the student's advisory committee. Failure of a student to pass the examination terminates one's work at this institution unless the advisory committee recommends a reexamination. No reexamination may be given until one full semester has elapsed and only one reexamination is permitted.

THE DISSERTATION

The doctoral dissertation presents the results of the student's original investigation in the field of major interest. It must represent a contribution to knowledge, be adequately supported by data and be written in a manner consistent with the highest standards of scholarship. Publication is expected.

The dissertation will be reviewed by all members of the advisory committee and must receive their approval prior to submission to the Graduate School. Three copies of the document signed by all members of the student's advisory committee must be submitted to the Graduate School by a specific deadline in the semester or summer session in which the degree is to be conferred. Prior to final approval, the dissertation will be reviewed by the Graduate School to insure that the format conforms to the specifications prescribed in the *Thesis and Dissertation Guide*. Detailed information on form and organization of the dissertation is presented in the University's *Thesis and Dissertation Guide* which is available in the NC State Bookstores.

The University has a requirement that all doctoral dissertations be microfilmed by University Microfilms International, of Ann Arbor, Michigan, which includes publication of the abstract in *Dissertation Abstracts International*. The student is required to pay for the microfilming service. (See "Special Registration and Fees" under "Tuition and Fees.")

TIME LIMIT

Doctoral students are allowed a maximum of six calendar years from admission to the doctoral program to attain candidacy for the degree and a maximum of ten calendar years to complete all degree requirements. Academic colleges/schools or departments may have more restrictive requirements than the above stated policy.

Summary of Procedures for Doctor of Philosophy and Doctor of Education Degrees

- ◆ Application materials and required fee received.
- ◆ Application materials reviewed by department or program.
- ◆ Department or program forwards recommendation regarding applicant's admissibility to Graduate Dean
- ◆ Graduate School reviews the recommendation and notifies the student of the action taken on the request for admission.
- ◆ Student arrives, reports to the department or program, is assigned a graduate advisor and develops a roster of courses and credits with the advisor.
- ◆ Student complies with requests from Graduate School for updated copies of transcripts from previous colleges or universities
- ◆ Student signs patent agreement and files with Graduate School
- ◆ Student subject to continuous registration policy until graduation.
- ◆ Advisory committee of at least four graduate faculty members appointed by the Graduate Dean upon the recommendation of the director of graduate programs.
- ◆ Graduate Dean appoints a Graduate School Representative to student's committee.
- ◆ A dissertation subject is selected and an outline of the proposed research submitted to the student's advisory committee and the director of graduate programs for review and approval.
- ◆ Plan of Graduate Work prepared by the student, in consultation with and with the approval of his/her graduate advisory committee and director of graduate programs, and forwarded to the Graduate School for approval as soon as feasible after completion of 12 hours of course work.
- ◆ Student passes language examination(s), if required.
- ◆ Written examinations in the major and minor fields are scheduled no earlier than the end of the second year of graduate study and not later than one semester before the final oral examination.
- ◆ When all written examinations have been completed satisfactorily, the chairman or the director of graduate programs requests the scheduling of the preliminary oral examination at least two weeks prior to the suggested date. Upon approval of the request, the Graduate School notifies the student and the examining committee of the time and place.
- ◆ The report of the examination is sent to the Graduate School and if the examination has been passed without conditions, the student is admitted to candidacy.
- ◆ A copy of the preliminary draft of the dissertation is submitted to the chair of the student's advisory committee for review.

- ◆ At least two weeks prior to the final oral examination, the chair of the student's advisory committee submits the dissertation to advisory committee members for review. A copy is submitted to the Graduate School Representative at least one week prior to the exam.
- ◆ One semester or its equivalent after admission to candidacy or later, after the dissertation is complete except for such revisions as may be necessary as a result of the final examination, and at least two weeks prior to the suggested date, the student's advisory committee chair or director of graduate programs requests the scheduling of the final oral examination. Upon approval of the request, the student and the examining committee, including the Graduate School representative, are notified of the time and place of the examination.
- ◆ Results of the final oral examination are forwarded to the Graduate School.
- ◆ Upon passing the final oral examination, three copies of the dissertation signed by each member of the student's advisory committee and five copies of the abstract must be submitted to the Graduate School by a specific deadline in the semester or summer session in which the degree is to be conferred. One copy each of the University Microfilms Agreement, the Survey of Earned Doctorate, and the Graduate School Exit Survey forms must be completed and sub-mitted with the dissertation.
- ◆ The dissertation is reviewed by the Graduate School to insure that the format conforms with the specifications prescribed in the *Thesis and Dissertation Guide*.
- ◆ All course work scheduled in a graduate degree classification must be completed prior to graduation.
- ◆ A grade point average of at least 3.0 for the degree requirements as well as on overall graduate course work at NCSU is required for graduation.
- ◆ The doctoral residence requirement of 2 residence credits must be satisfied.
- ◆ All degree requirements must be completed within ten years from admission to the doctoral program.

THE NCSU Libraries

Graduate students are one of the NCSU Libraries' most active user groups, and the library is committed to supporting their needs for information resources and services. The library system consists of the main D. H. Hill Library; four branches serving the specialized needs of programs in design, natural resources, textiles and veterinary medicine; and an affiliated library serving the College of Education and Psychology. Four studies in the D. H. Hill Library are available only to graduate students for use of computers or as lounges. Keys are available at the circulation desk.

The Libraries' collections contain more than 2.6 million volumes of books and bound journals, nearly 26,500 serials, and several hundred electronic resources. They are particularly strong in the biological and physical sciences, engineering, agriculture, forestry, textiles and architecture, with the arts, humanities and social sciences also well represented. The NCSU Libraries is a U.S. government documents depository and a U.S. patent depository. The Media Center offers audio, video and multimedia materials, with equipment for group and individual use.

The NCSU Libraries Information System extends access to a growing array of online resources, from indexes to full-text journals, which are accessible from library computers and from remote locations. Users can search the NCSU Libraries' holdings by author, title, subject and keyword as well as those of Duke, UNC-Chapel Hill and N. C. Central. In the Libraries' Learning and Research Center for the Digital Age, the Learning Technologies service offers help in applying new information technologies to instruction (*e.g.*, in developing Web-based courses), the Information Technologies Teaching Center offers instruction in their use and the Scholarly Communication Center gives guidance in matters such as copyright.

The Libraries provides interlibrary loan services to obtain material from other research libraries. Direct borrowing privileges are available with Duke, UNC-Chapel Hill and other UNC system schools. The TRIPSAver service delivers library materials from Duke, UNC-CH or NCCU with 48 hours of request. Also available are orientation tours, lectures on library use for all new students, e-mail reference service and in-depth reference service geared to the individual needs of graduate students.

Institutes

RESEARCH TRIANGLE - The unique "Research Triangle" in North Carolina has captured national and international attention. It is comprised of the Research Triangle Park, a world-renowned research park, and three major research uni-

versities. Because of this wealth of educational and research opportunities, the Triangle area contains the highest total of Ph.D. scientists and engineers on a per capita basis in the nation. The Triangle Universities--NC State, the University of North Carolina at Chapel Hill and Duke University--have a subsidiary campus in the Research Triangle Park--the Research Triangle Institute. The Institute, which operates as a contract research organization, has an annual research revenue of approximately \$122 million.

The Research Triangle Park, founded in 1959, now has more than 59 public and private industrial research facilities, situated on 6,800 acres of land. Over 34,000 people work in the park and over 30,000 additional jobs have been created outside the Park as a result of its existence. Organizations in the Park include such government facilities as the National Humanities Center, the National Institute of Environmental Health Sciences, the Environmental Protection Agency, and the National Center for Health Statistics. Private companies such as Glaxo Wellcome, Northern Telecom and Reichhold Chemicals have their North American headquarters in the Park. Two major, state-supported research initiatives in Microelectronics and Biotechnology are located in the Park and North Carolina's Supercomputing Center is housed there as well. Faculty and graduate students from the universities work closely with many of the Park companies. Scientists and researchers from companies like Glaxo Wellcome, IBM and Becton-Dickinson frequently hold adjunct appointments in one or another of the Triangle Universities.

INSTITUTE OF STATISTICS - The Institute of Statistics is composed of two sections, one at NC State and the other at UNC-Chapel Hill. At NC State, the Institute provides statistical collaborative services to all branches of the institution, sponsors research in statistical theory and methodology and coordinates the teaching of statistics at the undergraduate and graduate levels. The instructional and other academic functions are performed by the Department of Statistics, which forms a part of the Institute.

WATER RESOURCES RESEARCH INSTITUTE - The Water Resources Research Institute is a unit of the UNC System headquartered in Jordan Hall on the NC State campus. It is one of 54 state water institutes authorized by the Water Resources Research Act of 1964 to administer and promote federal/state partnerships in research and information transfer on water-related issues. WRI receives federally appropriated funds through the U.S. Department of Interior and state funding through the UNC system to enable it to identify and support research needed to help solve water quality and water resources problems in N.C. Research is conducted by faculty and graduate students of senior colleges and universities in N.C. WRI published peer-reviewed reports on completed research projects and arranges for technology transfer from researchers to state agency personnel and others who

can put the research results to work. The Institute also sponsors educational seminars and conferences and provides public information on water issues through publication of a newsletter.

Special Laboratories, Facilities and Centers

OFFICE OF INFORMATION TECHNOLOGY - The Office of Information Technology provides computing services and networking services via the University's Data Communications System. This system links most computing systems on campus, including the on-line library catalog, and also provides access to the Internet.

The Information Technology facility includes a UNIX- and NT-based client/server environment and software, including word processing, electronic mail, spreadsheets and math tools. Several networked public facilities are located on campus. Information Technology also provides an array of centralized services including data networking, consultation, short courses, software licensing, campus electronic information system through World Wide Web and instructional support.

A number of specialized computing facilities also exist in most colleges/schools which provide specialized education and research computing for their students. The University participates in the North Carolina Supercomputing Center and provides high bandwidth communications to CRAY vector and parallel supercomputers at the Center.

BIOLOGY FIELD LABORATORY - The Biology Field Laboratory is located eight miles from the University campus and comprises a 20-acre pond, 180 acres of extremely varied vegetation types and a modern laboratory building. The latter contains two laboratories, one for class use and another principally for research.

The many unique ecological situations found in this area make it ideal for use by advanced classes of most biological science departments. Likewise, the area is well adapted to a variety of research projects by faculty, graduate students and undergraduates because of its habitat diversity. The close proximity of the laboratory facility to the campus makes possible many types of behavioral, physiological, ecological, taxonomic and limnological studies that could be accomplished only with great difficulty at other locations.

CENTER FOR ADVANCED ELECTRONIC MATERIALS PROCESSING (AEMP) - The Center for Advanced Electronic Materials Processing was

established in 1988 and is one of the 21 NSF Engineering Research Centers in the nation. The center's program is interdisciplinary and involves collaboration among chemists, physicists, materials scientists and electrical, chemical, computer and mechanical engineers. The research focuses on the development of electronic materials processing technologies that will provide the capability of producing submicron electronic devices. The program emphasizes low thermal budget processes using plasma and thermal and optically assisted techniques as well as the automation and control of those processes. It is a joint effort with researchers from the University of North Carolina (Chapel Hill and Charlotte), Duke University, North Carolina A&T State University and MCNC.

CENTER FOR ASEPTIC PROCESSING AND PACKAGING STUDIES (CAPPS) - The Center for Aseptic Processing and Packaging Studies was established in October 1987 to promote cooperative research between university and industrial researchers and to further scientific knowledge in areas of food and pharmaceutical aseptic processing and packaging. The center is funded by the National Science Foundation, NCSU and industrial members from food, pharmaceutical and packaging industries. The objectives of the center are to support industrially relevant, fundamental research in aseptic processing and packaging, to enhance product quality and improve efficiency, and to communicate information gained from basic research to industry for development and marketing.

Graduate students working on CAPPS projects will be exposed to industrial concerns and given the opportunity to work first-hand with industry in solving problems and making practical application of their research.

CENTER FOR ADVANCED COMPUTING AND COMMUNICATION - CACC is an NSF-sponsored Industry/University Cooperative Research with research sites at NC State and Duke University. An advisory board comprised of representatives of member companies and government agencies meets twice a year to direct the Center's research activities. Faculty and graduate students also work closely with each member's technical staff on a variety of research projects.

The Center's mission is to carry out basic and applied research on problems having both industrial and academic relevance, to transfer these results to the members and to provide students with a challenging educational opportunity. The research goal is to create concepts, methods and tools for use in the analysis, design and implementation of advanced computer and communication systems. CACC has the unique capability to develop technology from theory to prototype.

CENTER FOR ENGINEERING APPLICATIONS OF RADIOISOTOPES - The Center for Engineering Applications of Radioisotopes was established in 1980 within the Department of Nuclear Engineering and associated with the Department of

Chemical Engineering. It is composed primarily of faculty and their graduate students doing research related to the measurement applications of radiation and radioisotopes in industry. This includes the use of short-lived radioactive tracers, radiation gauges, radiation analyzers and industrial computed tomography. Excellent experimental facilities are available including solid state detectors and the NC State PULSTAR Reactor. The Center's programs are financed largely by an Associates Program of Industrial Members and contracts and grants from industry and federal agencies.

CENTER FOR LEARNING TECHNOLOGIES - The Center for Learning Technologies (CLT) is a multimedia service facility located in the College of Education and Psychology. Students are instructed through workshops, classes and/or individualized training in the effective delivery of information and the design/production of instructional materials using a variety of computer technologies.

CENTER FOR RESEARCH AND DEVELOPMENT IN MATHEMATICS AND SCIENCE EDUCATION - The center, one of ten centers in the North Carolina Mathematics and Science Education Network, is the only research and development center in the network. Established within the Department of Mathematics, Science and Technology Education in 1984, the center conducts research and development activities for precollege students, preservice teachers, in-service teachers and University faculty. The center identifies areas of need in mathematics and science education and forms partnerships with federal, state, local and private funding agencies to work collaboratively to address the increasing student achievement. Grants have been obtained from the National Science Foundation, Office of Education, State Department of Public Instruction, Local Education Agencies and IBM to introduce changes that incorporate technology and active learning into the mathematics and science curriculum, K-16. In addition, the center supports graduate students and provides them with opportunities to write grants and to design, conduct and report on educational research.

CENTER FOR RESEARCH IN SCIENTIFIC COMPUTATION - The Center for Research in Scientific Computation (CRSC) is a formally recognized, multidisciplinary center of the greater University of North Carolina System. The CRSC is administered by NC State and the College of Physical and Mathematical Sciences. The purpose of the Center is to promote research in scientific computing and to provide a focal point for research in computational science, engineering and applied mathematics. Data-massive and/or computationally intensive problems provide ideal projects for training graduate students in applied mathematics. With advanced computing methodologies, students and postdoctoral fellows address important issues in processes of modelling and design.

Research topics of interest to CRSC faculty include a variety of problems in scientific computation, numerical analysis and numerical optimization with applications to such areas as fluid mechanics and flow control, smart materials and structures, nondestructive testing, acoustics, material sciences and manufacturing processes, population dynamics, environmental sciences, signal processing, computer performance evaluation and nuclear reactor physics.

CENTER FOR SOUND AND VIBRATION - The Center for Sound and Vibration, established in 1969 and administered within the Department of Mechanical and Aerospace Engineering, is composed of faculty pursuing the solution of a wide variety of problems such as occur in machinery and aircraft design particularly related to vibration and sound. Graduate programs exist at M.S. and Ph.D. levels in fields such as noise and vibration control, aeroacoustics, hearing conservation, computer-aided machinery design, active control of vibration and sound, and signal processing. Outstanding experimental facilities, including large anechoic and reverberant rooms and computer graphics equipment, are available. The Center's programs are financed largely by grants and contracts from industry and federal and state agencies.

DIAGNOSTIC TEACHING CLINIC - The Diagnostic Teaching Clinic is operated by the graduate program in special education within the College of Education and Psychology for the purposes of providing graduate students with opportunities to gain both observational and applied clinical experience in diagnosing and teaching exceptional students of all ages. The clinic accepts referrals from local school systems and from agencies and individuals within the community. Staff, which includes graduate interns, evaluates the referred clients, develops educational programs for them in conjunction with the referring agency and demonstrates teaching techniques for the benefit of those persons who will work with the children. This clinic is open during the day, late afternoon and early evening hours during the fall and spring semesters and throughout the summer months and is utilized by graduate students from several departments with allied curricula in education and psychology.

ELECTRIC POWER RESEARCH CENTER - The Electric Power Research Center is a university/industry cooperative research center established in 1985 within the College of Engineering. The Center is funded by the university and sponsoring organizations from the various sectors of the electric utility industry including equipment manufacturers and fuel ventors. The purpose of the Center is to foster the excellence of research and graduate-level degree programs in electric power systems engineering. Motivation for industrial firms to join with the Center derives from close university/industry interaction, the pooling of membership dues to sponsor research of mutual interest and the enhanced professional and research opportunities provided to faculty and students. While the current research program mainly

involves faculty from the Department of Electrical and Computer Engineering and the Department of Nuclear Engineering, the Center facilitates access to all the various resources of the University.

ELECTRON MICROSCOPE FACILITIES - There are three electron microscope facilities at NCSU available to graduate students and faculty for research purposes. The College of Agriculture and Life Sciences (CALS) Center for Electron Microscopy is located in Gardner Hall, the College of Engineering (COE) Analytical Instrumentation Facility (AIF) is in Burlington Engineering Labs and the College of Veterinary Medicine (CVM) Laboratory for Advanced Electron and Light Optical Methods (LAELOM) is located in the NCSU College of Veterinary Medicine on Hillsborough Street.

The CALS Center for Electron Microscopy offers complete service support in all areas of Biological Electron Microscopy. The Center has two scanning microscopes: a Philips 505T and a JEOL T-300 and two transmission electron microscopes: a JEOL 100S and a Philips 400T-STEM equipped with a C400M computer control system. The Center is also equipped with all of the necessary biological preparatory equipment.

Formal instruction is provided through the microbiology curriculum for transmission electron microscopy, scanning electron microscopy and ultramicrotomy. The Center also provides support, service and training in a wide variety of digital imaging. Advanced techniques are provided on an individual basis or through workshops.

The COE Analytical Instrumentation Facility (AIF) is equipped with an Hitachi S-3200N variable pressure scanning transmission microscope (VPSEM), two high resolution JEOL 6400F field emission scanning electron microscopes (FESEM) and a Cameca IMS-6f Ion Microscope. One 6400F is equipped with a Link Pentafet energy dispersive x-ray system capable of detecting low Z elements (down to boron). In addition, all microscopes are equipped with both film and direct digital imaging capabilities. Digital data acquisition capability allows direct computer display and storage of images greatly facilitating image processing and utilization for reports and publications.

The S-3200N VPSEM accommodates large (6-inch diameter) specimens and in the variable pressure mode can image wet, oily and non-conductive specimens in their natural state with up to 35Å resolution, greatly reducing or eliminating sample preparation requirements.

The JEOL 6400F field emission SEMs can handle up to 6-inch diameter samples and operate at very low accelerating voltages while maintaining high spatial resolution. The superior brightness and small spot size of the cold cathode field emission

electron sources on JEOL 6400F instruments enable them to resolve 14Å at an accelerating voltage of 30 keV and 70Å at 1.0 keV.

The state-of-the-art Cameca IMS 6f Ion Microscope is a high-performance, secondary ion mass spectrometry (SIMS) equipped with oxygen, cesium and gallium ion sources providing ppb to ppt sensitivity for most elements and a digital data acquisition system for acquiring and processing both 2-D and 3-D elemental distributions with atomic layer depth resolution and <0.1µm lateral resolution.

All microscopes are supported by complete materials specimen preparation, dark room and data processing facilities including several light microscopes and x-ray diffractometers. AIF analytical professionals teach regularly scheduled courses as well as short courses covering the analytical techniques available through AIF. They are also available for collaboration with and direct one-on-one instruction for graduate students.

The CVM Laboratory for Advanced Electron and Light Optical Methods (LAELOM) - The CVM LAELOM is a research/service/teaching facility housing all the optical equipment to examine cytological, histological and gross specimens, and the equipment to perform morphometric analyses, and to prepare material for presentations and publication. Individuals can prepare their own cryosections for light microscopy and immunological staining and can also prepare their own transmission and scanning electron microscopy samples. In addition, the LAELOM can prepare any and all of these materials for investigators. The LAELOM offers individual training in light microscopy, morphometry and darkroom work as well as a formal course in biological transmission and scanning electron microscopy techniques. A course covering photography in scientific illustration is taught in the LAELOM as part of the summer Biotechnology program. A Philips 410LS transmission electron microscope, a JEOL JSM-35 scanning electron microscope, an automated Olympus VANOX photomicroscope and a Wild photomicroscope are available to students and investigators as well as a fully equipped negative processing and print processing darkroom. Equipment is available to make 2 x 2 slides for presentations and to prepare posters and publication prints. The LAELOM offers consultation services for all these techniques in terms of specimen preparation, film selection, and cost determination for purposes of grant preparation.

HIGHLANDS BIOLOGICAL STATION - NCSU is an institutional member of the Highlands Biological Foundation which provides support for the Highlands Biological Station of the University of North Carolina. This is an inland biological field station located at Highlands, North Carolina. The town of Highlands is in the heart of the Southern Appalachians at an elevation of 3,823 feet. The area has an extremely diverse biota and the highest rainfall in the eastern United States.

Facilities are available throughout the year for pre-and post-doctoral research in botany, zoology, soils and geology. The laboratory building with research rooms and cubicles and the library are well equipped for field-oriented research. Also, five cottages and a dining hall are located on the edge of a six-acre lake. In addition to 16 acres surrounding the lake, the station owns several tracts of undisturbed forested land available for research. Research grants available through the Station provide stipends for room, board and research expenses.

INTEGRATED MANUFACTURING SYSTEMS ENGINEERING INSTITUTE-

The Integrated Manufacturing Systems Engineering Institute was established at NC State in 1984 to provide interdisciplinary educational, research and technology transfer program in manufacturing systems engineering. The objectives of this program are to educate engineers in the theory and practice of integrated manufacturing systems technology; to conduct basic and applied research on topics in cooperation with industry on problems of contemporary manufacturing system; and to engage in technology transfer with industry.

Central to all aspects of the Institute's operation and activity is in the integration of computer-aided processes in the design and control of manufacturing facilities. Through both internally and externally funded research projects the Institute contributes to the solution of generic design and manufacturing engineering problems and provides a vehicle for technology transfer.

LEARNING RESOURCES LIBRARY - The Learning Resources Library, administered by the College of Education and Psychology, is located in Poe Hall. The library maintains a collection of print and audio-visual materials and equipment with emphasis on teaching methods, research, administration and psychology. An extensive collection of state-adopted secondary level textbooks includes French, Spanish, language arts, mathematics, science, social studies and vocational education. Audio-visual equipment is available for instruction, research and previewing.

MARS MISSION RESEARCH CENTER - The Mars Mission Research Center is one of eight University Space Engineering Research Centers established by NASA to broaden the nation's engineering capability to meet the critical needs of the civilian space program. The goal of the center is to focus on educational and research technologies used in the design of spacecraft for planetary exploration with particular emphasis on Mars. It is a cooperative program involving faculty, undergraduate and graduate students at NC State and N.C. A&T State University. The research is a cross-disciplined program involving (1) hypersonic aerodynamics and propulsion, (2) composite materials and fabrication, (3) light-

weight structures and (4) spacecraft controls. Students and faculty conduct part of their research at NASA Centers and participating industries.

MATERIALS RESEARCH CENTER - The Materials Research Center was established in 1984 at NC State as an interdisciplinary program involving persons representing the Departments of Chemistry, Electrical and Computer Engineering, Materials Science and Engineering and Physics. The present thrust area of the Center concerning thin films and coatings serves as a focal point for this cooperative research. The experimental efforts are conducted within the four departments noted above.

MCNC - NC State is a participating member of MCNC which conducts research programs in information and electronics technologies in partnership with other N. C. institutions. Other participating institutions are UNC-Chapel Hill, Duke University, N.C. A&T State University, UNC-Charlotte and the Research Triangle Institute.

Faculty and students at NC State have access to the use of MCNC facilities on sponsored research projects. Areas of interest include systems design, systems engineering, integrated circuit fabrication technology, semiconductor materials, device physics, advanced packaging and interconnection technologies, microelectromechanical systems (MEMS), high performance computing and advanced networking research and development. Departments at NC State which are actively involved in the program include electrical and computer engineering, computer science, physics, chemistry, and materials science and engineering.

NUCLEAR REACTOR PROGRAM - The Nuclear Reactor Program (NRP) provides specialized nuclear facilities to the North Carolina academic and industrial communities. These facilities are used for teaching, research and service. The NRP supports graduate research and undergraduate programs in a wide variety of academic departments. Facilities include the PULSTAR Nuclear Reactor, the Nuclear Services Analytical Laboratories, Health Physics Laboratories and the Scaled Pressurized Water Reactor Facility (SPWRF). The PULSTAR Reactor is a 1-Megawatt research and training reactor. Irradiation capabilities include wet and dry vertical ports, horizontal beam tubes, a pneumatic transfer system and a graphite thermal column. Neutron radiography, prompt gamma activation analysis and neutron depth profiling facilities are permanently installed.

The Nuclear Services Laboratories are well-equipped to perform routine reactor irradiations, neutron activation analysis, isotope production and low level counting. The laboratories maintain ten high-purity Ge and GeLi detectors, two multi-station Nuclear Data Acquisition and Analysis Systems, a Liquid Scintillation Counting System, an Alpha Spectroscopy System, sample preparation equipment and

an extensive set of standards. The SPWRF is a non-nuclear working scale model of a two-loop pressurized water reactor that is used for teaching and research.

The Nuclear Reactor Program is part of the Department of Nuclear Engineering and is located in the Burlington Engineering Laboratories on the main NC State campus.

ORGANIZATION FOR TROPICAL STUDIES - NC State is an institutional member of the Organization for Tropical Studies (OTS), a consortium of North and Central American universities which maintains field research and teaching facilities in Costa Rica. Each year OTS offers a series of courses that are open to NC State graduate students including tropical biology, agroecology, agroforestry and tropical agricultural biology. These 8-week courses, offered in winter and summer, are taught in Costa Rica and make use of a network of OTS field stations located throughout the country.

The OTS facilities in Costa Rica also provide a unique opportunity for tropical research by NC State graduate students and faculty. The principal field station, located in the northeastern Atlantic lowlands, has excellent laboratory and housing facilities and provides access to a 3,500-acre tract owned by OTS. Another station is located at mid-elevation in southeastern Costa Rica near the Panamanian border. OTS also utilizes various other sites, including a seasonally dry area in the northwestern part of the country and a high-elevation area at 10,000 feet in the Talamanca range. More information about OTS may be obtained through the International Programs Office of the College of Agriculture and Life Sciences.

PESTICIDE RESIDUE RESEARCH LABORATORY - The Pesticide Residue Research Laboratory is a facility in the College of Agriculture and Life Sciences devoted to determining the environmental fate of pesticide residues primarily in air, plants, soils and water. Although the laboratory is administered through the Department of Toxicology, it serves the total needs of the College in cooperative research projects requiring pesticide residue analysis.

Although the laboratory functions as a focal point for residue research involving interdepartmental cooperation, the faculty in the laboratory conduct independent research on the fate of pesticides, indoors, after applications in urban environments and their movement and persistence in plants, soils and water after agricultural applications.

The laboratory is equipped with gas, High Performance Liquid and Capillary Electrophoresis chromatographs, a GC/MS and all ancillary items required to prepare samples for quantitation. Graduate study can be undertaken in any aspect of pesticide residue research either in the Pesticide Residue Research Laboratory or through one of the cooperating departments.

PRECISION ENGINEERING CENTER - The Precision Engineering Center was established in 1982. The goal is to develop techniques for metrology and manufacturing at tolerances below those attainable with current technology. For example, fabrication of future electro-optical devices will require manufacturing tolerances better than 1 millionth of an inch. This goal requires new methods for measuring and controlling the parts being produced or the process being performed. Specific research objectives involve the study of metrology systems, control algorithms, machine structural dynamics, optics, materials, and micro-processors and the details of many different fabrication processes. An interdisciplinary team of faculty from Mechanical and Aerospace Engineering, Materials Science and Engineering, Computer Science and Physics along with research staff and graduate students are working together to address these research areas. The Center is housed in a state-of-the-art facility on the Centennial Campus.

PSYCHOEDUCATIONAL CLINIC AND LABORATORIES - The Department of Psychology operates the Psychoeducational Clinic located in Poe Hall. The clinic provides both a service to the public and training for school psychology graduate students. The Clinic serves children from preschool through adolescence, and services include evaluation, intervention and consultation.

SEA GRANT COLLEGE PROGRAM - North Carolina Sea Grant College Program is a state/federal partnership program involving all campuses of the University of North Carolina system. Sea Grant combines the university's expertise in research, extension and education to focus on practical solutions to problems in the area of coastal and marine resource use and conservation. Graduate and undergraduate research opportunities rest with individual project directors on campus via a special graduate fellowship program administered through the program office.

SOUTHEASTERN PLANT ENVIRONMENTAL LABORATORIES - PHYTOTRON - The Southeastern Plant Environment Laboratory, often referred to as the NC State Phytotron, is especially designed for research dealing with the response of plants and microorganisms to their environment. A high degree of environmental control makes possible simulation of a wide range of climates found in tropical, temperate and northern zones.

Research in the Phytotron deals with all phases of plant biology. Although the majority of the studies are conducted with agricultural and horticultural crop species, the Phytotron can accommodate ecological investigations, plant biology problems of the space program, experimental taxonomy and air pollution studies as well as basic physiological, biochemical and plant molecular biology research. The Phytotron facility is available to the resident research staff, participants in graduate research programs of NC State and to domestic and foreign visiting scientists.

TRIANGLE UNIVERSITIES NUCLEAR LABORATORY - TUNL is a laboratory for nuclear structure research. Located on the campus of Duke University in Durham, the laboratory is staffed by faculty members and graduate students in the Departments of Physics of Duke University, UNC-Chapel Hill and NCSU. There is extensive collaboration with personnel from the other two participating universities and with the many visiting physicists from the United States and abroad. Particle accelerators are used to bombard target nuclei with an assortment of ions of accurately controlled energy spread and spin orientation. The accelerators are a 15-MeV tandem Van de Graaff accelerator and a 4-MeV Van de Graaff accelerator. Polarized and pulsed beams are available as well as polarized targets. In addition, TUNL physicists perform experiments at major national and international nuclear physics facilities.

Special Program

RESEARCH PROGRAM AT THE OAK RIDGE ASSOCIATED UNIVERSITIES - NCSU has been a sponsoring institution of Oak Ridge Associated Universities (ORAU) since 1949. ORAU is a private, not-for-profit consortium of 95 colleges and universities and a management and operating contractor for the U.S. Department of Energy (DOE) with principal offices located in Oak Ridge, Tennessee. Founded in 1946, ORAU provides and develops capabilities critical to the nation's technology infrastructure, particularly in energy, education, health, and the environment. ORAU works with and for its member institutions to help faculty and students gain access to federal research facilities; to keep members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among our members in areas where their collective strengths can be focused on issues of national importance.

ORAU manages the Oak Ridge Institute for Science and Education (ORISE) for DOE. ORISE is responsible for national and international programs in science and engineering education, training and management systems, energy and environment systems, and medical sciences. ORISE's competitive programs bring students at all levels, K-12 through postgraduate, and university faculty members into federal and private laboratories.

ORAU's Partnership Office seeks out opportunities for collaborative alliances among its member universities, private industry, and federal laboratories. Current alliances include the Southern Association for High Energy Physics (SAHEP) and the Center for Bio-Electromagnetic Interaction Research (CBEIR). Other UIGA activities

include the sponsorship of conferences and workshops, the Visiting Scholars program and the Junior Faculty Enhancement Awards.

Contact Jack H. Britt, (919) 829-4213, for more information about ORAU programs.

University Patent and Copyright Procedures

North Carolina State University is dedicated to teaching, research and extending knowledge to the public.

It is the policy of the University to carry out its scholarly work in an open and free atmosphere and to publish results obtained therefrom freely, limited only by a short time delay in cases in which this is necessary to prepare and file applications. Patentable inventions sometimes arise out of the research activities of its faculty, staff and students which are carried out wholly or in part with University facilities. As a public service institution, the University has an interest in assuring the utilization of such inventions for the public good. Protection must be provided for at least some of these inventions through patents and the licensing thereof to encourage their development and marketing. Patents and their exploitation, however, represent only a small part of the benefits accruing from either publicly or privately sponsored research.

A portion of the research conducted by the University is supported by government and a portion by private industry. Service to the public, including private industry, is an integral part of the University's mission. As a public institution, the University, in its agreements with private industry or other private organizations, must keep the interests of the general public in view. The rights and privileges set forth in cooperative agreements or contracts, with respect to patents and copyrights developed as a result of research partly or wholly financed by private parties, must be fair and just to the inventor(s), the sponsor and the public. Research should be undertaken by the University under support from private parties only if it is consistent with and complementary to the University's goals and responsibilities to the public.

SECTION 100—Purposes:

The North Carolina State University Patent and Copyright Procedures are designed to implement the Patent and Copyright Policies of The University of North Carolina. The procedures incorporate the interests of the faculty, staff, and students,

the institution, and the sponsors of research, because in many cases those interests are congruent in desiring to encourage innovation and assure broad dissemination of the results of research. These procedures are designed to stimulate and recognize creativity among the faculty, staff, and students, and to establish an institutional process that is flexible enough to accommodate the different types of research and patentable work conducted at a comprehensive research university such as NC State. Equity and fairness are goals of the procedures in all respects, not only in the distribution of royalty, but also in recognition. Finally, these procedures should provide an efficient and timely mechanism for reaching a decision about patenting with a minimum involvement of the inventor's time so that he or she may continue to be productive in the laboratory and classroom. To this end the University employs a patents administrator whose duties include providing assistance to faculty, staff and students in matters related to inventions.

SECTION 200—Ownership:

1. As defined by the Patent and Copyright Policies of the Board of Governors of The University of North Carolina, to which these Procedures are expressly subject, NC State University has an interest in all inventions of University personnel, *including students*, that are conceived or first actually reduced to practice as a part of or as a result of: (a) University research; (b) activities within the scope of the inventor's employment by, or official association with, the University; and (c) activities involving the use of University time, facilities, staff, materials, University information not available to the public, or funds administered by the University.

2. Faculty, staff, and *students*, whose inventions are made on their own time, outside the scope of their employment or association with the University and without University facilities, materials, or resources and which inventions are, therefore, their exclusive property as specified by the Patent and Copyright Policies, may submit their invention to the University for possible patenting and/or commercial exploitation and management under terms to be agreed upon by the inventor and the University.

3. The provisions of the NC State Patent Procedures are subject to any applicable laws, regulations or specific provisions of the grants or contracts which govern the rights in inventions made in connection with sponsored research.

4. Under the terms of certain contracts and agreements between NC State and various agencies of government, private and public corporations, and private interests, NC State is or may be required to assign or license all patent rights to the contracting party. NC State retains the right to enter into such agreements whenever such action is considered to be both in its best interest and in the public interest. Ordinarily, the University will not agree to grant rights in future inventions to private corporations or businesses except as set forth in these procedures.

5. All faculty, staff and *students* engaged in University related or sponsored research shall sign a Patent Agreement.

6. *Students who are pursuing only non-research related studies shall not be obligated to sign an NC State Patent Agreement. However, if the student should make an invention which is, or may be, subject to University ownership in accordance with the Patent and Copyright Policies, the student shall disclose the invention to the University as provided under these Procedures and the University, together with the student, shall determine an equitable resolution of ownership rights.*

SECTION 300--Responsibilities of NC State Personnel (Including Students):

1. NC State personnel who, either alone or in association with others, make an invention in which NCSU has or may have an interest shall disclose such inventions to the Vice Chancellor for Research. The Vice Chancellor for Research will promptly acknowledge receipt of disclosures and will distribute the disclosures to the Intellectual Property Committee for consideration at its next meeting.

2. For any invention in which the University has an interest, the inventor, upon request of the Vice Chancellor for Research shall execute promptly all contracts, assignments, waivers or other legal documents necessary to vest in the University or its assignees any or all rights to the invention, including complete assignment of any patents or patent applications relating to the invention.

3. NC State personnel may not: (a) sign patent agreements with outside persons or organizations that may abrogate the University's rights and interests either as stated in the Patent Policies or as provided in any grant or contract funding the research which led in whole or in part to making the invention, nor (b) without prior authorization, use the name of the University or any of its units in connection with any invention in which the University has an interest.

4. *All faculty teaching courses in which students do work that may lead to patentable inventions should inform the students of the existence of the NC State Patent and Copyright Policies and of these Procedures.*

SECTION 400--Suggested Procedures For Record-Keeping:

1. U.S. patent practice places a premium on witnessed records when two or more parties claim the same invention. The date the idea occurred (the "conception") and the date it was put into practice form ("reduced to practice") are vital. Equally important in the eyes of the U.S. Patent Office is the "diligence" shown by contending inventors. They must prove that they regularly pursued work on the invention, documenting their efforts on a day-by-day basis. The intent of U.S. patent laws is to recognize the first inventor; the one who originated the idea. Under these laws, the first to conceive and reduce to practice will receive a patent if his records bear out his claims; the first to conceive and the last to reduce to practice may win if his records show diligence.

2. *The careful recording of ideas and laboratory data is a matter of routine for industrial researchers. Each entry is complete and up-to-date, signed and witnessed;*

a legal record of the day's work. Record-keeping is not nearly so simple for the academic investigator, for he or she may work at odd hours or on weekends; may be closeted in a laboratory, an office or at home; and often lacks easy accessibility to suitable witnesses. Still, the keeping of a witnessed laboratory notebook is advisable. Additionally, such records can serve as valuable repositories of new ideas.

SECTION 500--The Handling of a Disclosure:

1. When faculty, *students* or staff members make an invention, it shall be their responsibility to discuss their discovery or invention with the Department Head at which time the possibility of exploring patenting should be considered. *Students should first discuss an invention with their instructor, who shall assist them in further discussion within the University.* The Director of Technology Administration is available to discuss possible inventions and to assist faculty, staff and students in the preparation of disclosures. If the invention appears to be a matter that should be considered for patenting, the inventor(s) should prepare a disclosure utilizing guidelines for invention disclosures which can be obtained for the Director of Technology Administration. The Department Head should transmit the disclosure through the Dean of his School to the Vice Chancellor for Research for consideration by the Intellectual Property Committee.

2. Upon receiving a disclosure, the Chairman of the Intellectual Property Committee may refer the disclosure to one of several technical advisory committees to the Intellectual Property Committee. Technical advisory committees will be appointed by the Vice Chancellor for Research and will be composed of faculty and staff who are knowledgeable and experienced in broad disciplinary or cross-disciplinary areas. These individuals will be asked to review the disclosure from the point of view of whether or not, based on their knowledge, they believe the invention, if patented, would be a strong, viable, commercial product that would have a large market. The technical advisory committee in each area will meet prior to each Intellectual Property Committee meeting if they have any disclosures presented to them, and will discuss the disclosures and make to the Intellectual Property Committee, prior to its meeting, one of the following recommendations:

A. That the disclosure has significant commercial possibilities.

B. That the disclosure does not appear to have significant commercial possibilities.

C. That the technical advisory committee could not determine, based on its knowledge, whether or not the disclosure has significant commercial possibilities.

3. The Intellectual Property Committee will review each written disclosure promptly. The inventor or a representative shall be allowed to examine all written materials submitted to the Committee in connection with the disclosure and to make a written and oral presentation to the Committee. The Committee will decide on a disposition of the invention to secure the interests of the University, the inventor, the

sponsor, if any, and the public. Its decision may include, but is not limited to, one or a combination of the following:

A. To submit the disclosure for review by a patent or invention management firm or agent;

B. To make inquiries of potential licensees that may have an interest in the invention, including the financing of a patent application, where applicable;

C. To conduct a patent search concerning the patentability of the disclosure;

D. To apply for a patent with University resources (an option with limited application because of financial constraints);

E. To release University rights to the inventor subject to an agreement to protect the interests of the University, the sponsor, if any, and the public, including an obligation to pay to the University a percentage of future royalties or profits in cases where it is necessary to recognize the University's contribution;

F. To dedicate the invention to the public;

G. To waive further University interest in the invention.

4. Normally, within four weeks of the receipt of the disclosure, the inventor will be notified in writing of the decision of the Committee on (a) the equities involved including financial participation, (b) whether the University plans to file a patent application, or (c) whether the University will accept assignment of the invention for patenting, licensing and/or commercial handling as applicable. If the University chooses not to file a patent application for an invention in which it has rights, or not to license the invention, or not to dedicate it to the public, upon the inventor's written request the invention, at the Committee's discretion, may be released in writing to the inventor, with the permission of the sponsor, if any.

5. In those cases in which the University has obtained a patent without obligation to sponsors, if no arrangement has been made for commercial development within five years from the date of the issuance of the patent, the inventor(s) may request in writing an assignment of the University's patent rights. The Intellectual Property Committee will promptly either grant the request or advise the inventor of the University's plans for the development of the invention.

SECTION 600--Royalty:

1. NC State shall share with the inventors revenue it receives from patents or inventions. As noted in Section 200 (4), specific provisions of grants or contracts may govern rights and revenue distribution regarding inventions made in connection with sponsored research; consequently, revenues the University receives from such inventions may be exclusive of payments of royalty shares to sponsors or contractors.

2. The gross royalty revenues (net amount received by the University if there is a specific agreement in a grant or contract with a sponsor) generated by a patent or invention shall be the basis upon which the inventor's royalty is calculated. Unless otherwise agreed, the inventor's share of royalty revenues shall be 25 % of the gross

revenue. In the case of co-inventors, the 25 % of gross revenue shall be subdivided equally among them, unless the inventors, with the concurrence of the Intellectual Property Committee, determine a different share to be appropriate. Applicable laws, regulations or provisions of grants or contracts may, however, require that a lesser share be paid to the inventor. In no event shall the share payable to the inventor or inventors in the aggregate by the University be less than 15% of gross royalties received by the University.

3. To the extent practicable and consistent with State and University budget policies, the remaining revenue received by the University on account of an invention will first be applied to reimburse the University for expenses incurred by it in obtaining and maintaining patents and/or in marketing, licensing and defending patents or licensable inventions and the remainder will be dedicated to research purposes that may include research in the inventor's department or unit, if approved by the Chancellor upon recommendation of the Intellectual Property Committee.

SECTION 700--Inventor Requests for Waiver of University Rights:

1. If an inventor believes that the invention was made outside the general scope of his or her University duties, and if the inventor does not choose to assign the rights in the invention to the University, he or she shall, in the invention disclosure, request that the Intellectual Property Committee determine the respective rights of the University and the inventor in the invention and shall also include information on the following points:

- A. The circumstances under which the invention was made and developed;
- B. The employee's official duties at the time of the making of the invention;
- C. The inventor's intention to request an acknowledgment that the University has no claim if such request is deemed appropriate;
- D. The extent to which the inventor is willing voluntarily to assign domestic and foreign rights in the invention to the University if it should be determined that an assignment of the invention to the University is not required under the Patent and Copyright Policies;
- E. The inventor's intention to request that the University prosecute a patent application if it should be determined that an assignment of the invention to the University is not required under the Patent and Copyright Policies.

SECTION 800--Publication and Public Use

1. North Carolina State University strongly encourages scholarly publication of the results of research by faculty and students. Though the Patent and Copyright Policies do not limit the right to publish, except for short periods of time necessary to protect patent rights, publication or public use of an invention constitutes a statutory bar to the granting of a United States patent for the invention unless a patent application is filed within one year of the date of such publication or public use. Publication or public use also can be an immediate bar to patentability in certain foreign countries.

2. In order to preserve rights in unpatented inventions, it shall be the duty of the inventor, or of his or her supervisor if the inventor is not available to make such report, to report immediately to the Vice Chancellor for Research any publication, submission of manuscript for publication, sale, public use, or plans for sale or public use, of an invention, if a disclosure has previously been filed. If an invention is disclosed to any person who is not employed by the University or working in cooperation with the University upon that invention, a record shall be kept of the date and extent of the disclosure, the name and address of the person to whom the disclosure was made, and the purpose of the disclosure.

After disclosure to the Intellectual Property Committee, the inventor shall immediately notify the Vice Chancellor for Research of the acceptance for publication of any manuscript describing the invention or of any sale or public use made or planned by the inventor.

SECTION 900--Contractual Arrangements:

1. North Carolina State University will follow Federal Regulations with respect to election of title in contracts and grants with Federal agencies.

2. The University normally reserves the right to ownership of patents on inventions arising out of research supported in whole or in part by grants or contracts with non-governmental organizations or firms. Contracts or agreements which are entered into between the University and such organizations or agencies should contain clauses setting forth such a reservation unless deviations therefrom are requested by the sponsor and approved by the Vice Chancellor for Research. In the interest of fair treatment to the sponsor in consideration for an investment and in the interest of discharging the University's obligation to the public in the application of its facilities and employee time and talent, special provisions may be negotiated by the Vice Chancellor for Research in such non-government sponsored contracts on options such as the following:

A. The University will retain rights to patents arising out of such sponsored research but, if a significant portion of the research costs are borne by the sponsor, including direct costs, the sponsor may be assured a non-exclusive, non-assignable license at a most favorable royalty rate for the use of the patent.

B. Other patent licensing alternatives may be negotiated in the research contract based on factors which will promote effective and expeditious transfer of the technology. Research sponsors are encouraged to seek guidance from the Office of the Vice Chancellor for Research.

C. In order to protect the potential patent interests of both parties in such contracts in which the sponsor is accorded patent rights, the following procedure may be specified:

"When in the course of the sponsored research project the investigator or investigators conceive or reduce to practice some discovery which appears to be patentable, then the inventor(s) will immediately inform the sponsors and the University of such discovery and will, for a specified period as negotiated (normally

three months but in any case not more than twelve months), make available to the sponsor all pertinent information and disclosures which may be required for the development of an appropriate patent application. During this period, the investigators agree not to disclose this material to the public and agree to cooperate in the sponsor's effort to secure the patent. At the end of this agreed period, the investigators and the University will be free to proceed with publications and making public such other documents as they may choose. With the exception of the above mentioned agreed period, the University will operate industry sponsored contracts in the normal manner with no other special considerations being given to the sponsor. Under no circumstances will the sponsor have the right to prevent the publication of material or information derived during the conduct of the program or as a result thereof other than for the agreed period indicated above."

Prior written agreement of the investigators involved in research investigations to be carried out under these conditions must be secured by the University to enable the University to discharge its agreed obligations under such a contract.

SECTION 1000--Patent Management and Administration:

1. North Carolina State University recognizes that the evaluation of inventions and discoveries and the administration, development and processing of patents and licensable inventions involves substantial time and expense and requires talents and experience not ordinarily found among its faculty and staff; therefore, it employs the Director of Technology Administration to provide assistance. The University may contract with outside agents for certain services. It may enter into a contract or contracts with an outside organization covering specific inventions or discoveries believed to be patentable and patents developed therefrom or covering all such inventions, discoveries and patents in which the University has an interest. The University may manage an invention using its own resources.

2. The Chancellor shall appoint a Intellectual Property Committee consisting of no fewer than three members. The Vice Chancellor for Research shall serve as Chairman of the Committee. The Committee shall review and recommend to the Chancellor or the Chancellor's delegate changes in these Procedures, decide upon appropriate disposition of invention disclosures, resolve questions of invention ownership, recommend to the Chancellor the expenditure of invention royalties, and make such recommendations as are deemed appropriate to encourage disclosures and to assure prompt and effective handling, evaluation, and prosecution of invention opportunities and to protect the interests of the University and the public. The Director of Technology Administration shall serve as staff for the Committee and shall attend all meetings.

SECTION 1100--Copyright Procedures:

1. As a general rule, all rights to copyrightable material are the property of the author. The distribution or royalties, if any, is a matter of arrangement between the

author and his or her publishers or licensees. Different treatment may be accorded by the University in case of specific contracts providing for an exception, in cases where the University or sponsor may employ personnel for the purpose of producing a specific work, where different treatment is deemed necessary to reflect the contribution of the institution to the work, as in the case of software or audiovisual material, or where a sponsored agreement requires otherwise. All agreements concerning copyright ownership should be in writing and should be signed by the parties and approved by the Vice Chancellor for Research prior to the commencement of the work.

2. An institute, center, or other unit of the University that is itself a publisher and that engages faculty members and other employees to write for publication by that unit as a part of their professional duty or produce other copyrightable materials, such as audiovisual materials or computer software, may, subject to the approval of the Vice Chancellor for Research, adopt rules providing that copyright on materials prepared by such faculty members and other employees in the course of their professional work for that unit vests in the University and not in the author.

3. Guidelines and procedures for determining faculty, staff and *student* ownership of computer software were adopted by the NC State Board of Trustees, effective July 1, 1987, and are available from the Office of the Vice Chancellor for Research or the Office of Technology Administration, Room 1 Holladay Hall.

FIELDS OF INSTRUCTION

This section identifies and gives pertinent information about all the fields of study that participate in graduate education at NC State. There are a total of 86 different fields offering graduate degrees. In addition, there are nine fields that offer minors at the graduate level and eleven areas that support graduate support graduate education through offering graduate level courses or in some other capacity. Fields of instruction that offer graduate degrees are listed first. Information given for each field include the faculty, requirements for admission to and completion of the degree program(s), student financial support, courses offered and other relevant information. Following the degree offering fields is a listing other fields of instruction which offer graduate minors, graduate courses or support graduate education in some other way. To avoid duplication, basic Graduate School requirements for admission and completion of graduate degree programs are not duplicated for each field of instruction. Only those requirements that are unique to the field are given in the sections on the individual fields. Graduate School requirements are given in detail on pages 15-17 and pages 40-55 in this catalog and are summarized below.

Fields Offering Graduate Degrees

The Graduate School offers major programs of study in the following fields. Except where noted by an ♦ or an exception in parentheses, these programs required the Graduate Records Examination (GRE) scores and will not take action on applications unless accompanied by scores for at least the GRE General (Aptitude) Test (verbal, quantitative and analytical):

Accounting - Master of (GMAT)

Adult and Community College Education - Master of Education, M.S., Ed.D. (GRE or MAT)

Aerospace Engineering - M.S., Ph.D.

Agricultural and Resource Economics - M.S. (Exceptions apply; consult program)

Agricultural and Extension Education - Master of, M.S. (GRE or MAT)

Animal Science - Master of Animal Science, M.S., Ph.D.

Applied Mathematics - M.S., Ph.D. (and GRE Subject Test)

Architecture - Master of (Exceptions apply; consult program)

Biochemistry - Master of, M.S., Ph.D.

Biological and Agricultural Engineering - Master of, M.S., Ph.D. (Exceptions apply; consult program)

Biomathematics - Master of, M.S., Ph.D.

Botany - Master of, M.S., Ph.D.

Chemical Engineering - Master of, M.S., Ph.D.

Chemistry - Master of, M.S., Ph.D. (Not required but strongly encouraged)

Civil Engineering - Master of, M.S., Ph.D.
 Comparative Biomedical Sciences - M.S., Ph.D.
 Computer Engineering - M.S., Ph.D.
 Computer Science - Master of, M.S., Ph.D. (and GRE Subject Test)
 Counselor Education - Master of, M.S., Ph.D. (GRE or MAT)
 Crop Science - Master of, M.S., Ph.D.
 Curriculum and Instruction - Master of Education, M.S., Ph.D. (GRE or MAT)
 Economics - Master of, M.A., Ph.D. (Exceptions apply; consult program)
 Educational Research and Policy Analysis - Ph.D. (GRE or MAT)
 Electrical Engineering - Master of, M.S., Ph.D.
 ♦Engineering--Master of (Off-campus program only)
 English - M.A.
 Entomology - Master of, M.S., Ph.D.
 Fiber and Polymer Science - Ph.D.
 Fisheries and Wildlife Sciences - Master of, M.S. (GRE and GRE Subject Test not required but strongly encouraged)
 Food Science - Master of, M.S., Ph.D.
 Forestry - Master of, M.S., Ph.D.
 Genetics - Master of, M.S., Ph.D.
 Graphic Design - Master of (Exceptions apply; consult program)
 Health Occupations Teacher Education - Master of Education, M.S. (GRE or MAT)
 Higher Education Administration - Master of Education, M.S. (GRE or MAT)
 History - M.A.
 Horticultural Science - Master of, M.S., Ph.D.
 Immunology - Master of, M.S., Ph.D.
 Industrial Design - Master of (Not required but strongly encouraged)
 Industrial Engineering - Master of, M.S., Ph.D.
 Integrated Manufacturing Systems Engineering - Master of (Exceptions apply; consult program)
 International Studies - Master of
 Landscape Architecture - Master of (Not required but strongly encouraged)
 ♦Liberal Studies - M.A.
 Management - M.S. (GMAT)
 Marine, Earth and Atmospheric Sciences - M.S., Ph.D. (and GRE Subject Test)
 Materials Science and Engineering - Master of, M.S., Ph.D. (Exceptions apply; consult program)
 Mathematics - M.S., Ph.D. (and GRE Subject Test)
 Mathematics Education - Master of Education, M.S., Ph.D. (MR, GRE or MAT; PhD, GRE only)
 Mechanical Engineering - Master of, M.S., Ph.D.
 Microbiology - Master of, M.S., Ph.D.
 Middle Grades Education - Master of Education, M.S. (GRE or MAT)
 Natural Resources - Master of, M.S.
 Nuclear Engineering - Master of, M.S., Ph.D. (Exceptions apply; contact program)

Nutrition - Master of, M.S., Ph.D.
 Operations Research - Master of, M.S., Ph.D. (Exceptions apply; contact program)
 Parks, Recreation and Tourism Management - Master of, M.S.
 Physics - M.S., Ph.D. (and GRE Subject Text)
 Physiology - Master of, M.S., Ph.D.
 Plant Pathology - Master of, M.S., Ph.D.
 Political Science - M.A. (and GRE Subject Test. Not required but strongly encouraged)
 Poultry Science - Master of, M.S. (Not required but strongly encouraged)
 Psychology - M.S., Ph.D. (and GRE Subject Test and MAT. Not required but strongly encouraged)
 Public Administration - Master of, Ph.D.
 Public History - M.A.
 Rural Sociology - M.S.
 Science Education - Master of Education, M.S., Ph.D (MR, GRE or MAT; PhD, GRE only)
 Sociology - Master of, Ph.D.
 ♦ Soil Science - Master of, M.S., Ph.D.
 Special Education - Master of Education, M.S. (GRE and MAT)
 Statistics - Master of, M.S., Ph.D.
 Technical Communication - M.S.
 Technology Education - Master of Education, M.S. (GRE or MAT)
 Textile Chemistry - M.S.
 Textile Engineering - M.S.
 Textiles - Master of, M.S.
 Textile Technology Management - Ph.D. (GRE or GMAT)
 Toxicology - Master of, M.S., Ph.D.
 Training and Development - Master of Education, M.S. (GRE or MAT)
 Wood and Paper Science - Master of, M.S., Ph.D.
 Zoology - Master of, M.S., Ph.D. (and GRE Subject Test. Not required but strongly encouraged)

Departments not normally requiring GRE scores may in special instances require their submission as additional information to be used in making a judgment of the student's potential for succes in a graduate program.

The following fields and units, while not offering graduate degrees, support graduate education by offering graduate minors and graduate courses or in some other capacity:

Anthropology	Biotechnology
Artificial Intelligence	Business Management
Biological Sciences	Communication
Biomedical Engineering	Computational Engineering and Sciences

Design
Ecology
Education
Engineering
Foreign Languages and Literatures

Philosophy
Plant Physiology
Solid State Sciences
Water Resources
Women's and Gender Studies

BASIC GRADUATE SCHOOL REQUIREMENTS

Basic Requirements for Admission

Basic requirements for admission to the Graduate School include two official transcripts from all colleges and universities previously attended, references from at least three people who know of the student's academic record and potential for graduate study, a non-refundable \$55.00 application fee, Test of English as a Foreign Language (TOEFL) scores for students whose first language is not English, and, in most cases, an official statement of the student's Graduate Record Examination (GRE) scores and/or other standardized tests. The minimum TOEFL score, unless otherwise specified, is 550, with scores of at least 50 on at least two of the sections and no section score below 45. The student's area of special interest may have additional requirements which are included in the individual program descriptions to follow.

Basic Requirements for Master's Degrees

A minimum of 30 semester credit hours is required for all master's degrees; however, many programs require more than thirty. Also, many students, in order to gain the breadth desired in their program or to make up deficits in their undergraduate degree, will actually take more credit hours than the minimum required by the program. At least 20 semester hours must come from 500- through 800-level courses. No more than two credit hours of departmental seminar may be included in the minimum 30-credit program. Programs that require a thesis may include no more than six hours of research credit (695) in the minimum 30-credit-hour program. Research credit is not appropriate in the non-thesis programs. Non-thesis programs may include no more than six hours of independent study credits in the minimum 30-credit program. Courses at the 400 level counted toward the minimal 30-hour requirement may not come from the major field.

Basic Requirements for Doctoral Degrees

The doctorate symbolizes the ability of the recipient to undertake original research and scholarly work at the highest levels without supervision. The degree is therefore not granted simply upon completion of a stated amount of course work but rather

upon demonstration by the student of a comprehensive knowledge and high attainment in scholarship in a specialized field of study. The student must demonstrate this ability by passing written and oral preliminary comprehensive examinations in the field of specialization and related areas of knowledge, where applicable, and by successfully defending the methodology used and conclusions reached in the research, as reported in the dissertation, in an open oral examination. In addition, the student must complete a minimum of 72 credit hours and meet the residence requirement as described earlier.

COURSES

The courses listed in this catalog are planned for the academic years 1998-1999 and 1999-2000, unless otherwise indicated. Graduate-level courses are numbered at the 500, 600, 700 and 800 levels. Advanced undergraduates and persons holding baccalaureate degrees are eligible to enroll in 500- and 600-level courses, which are master's courses. Courses at the 700 and 800 level are doctoral courses and are open only to persons holding baccalaureate degrees. Exceptions may be made for undergraduate students in honors program. Consent of the department is required for enrollment in all 600- and 800-level courses. Refer to the NC State University Courses Catalog for course descriptions and prerequisites.

Course Descriptions

For a description of courses being offered, either consult the Graduate School Home page on the World Wide Web at <http://www2.acs.ncsu.edu/grad/> or obtain a copy of the NC State Course Catalog, listing all undergraduate and graduate courses.

MAJOR FIELDS OF STUDY

Accounting

Degree Offered: Master of Accounting

GRADUATE FACULTY

KPMG Peat Marwick Professor C. J. Messere, *Head of the Department*
Professor R.L. Peace, *MAC Director*

Box 8113, (919) 515-4431, bob_peace@ncsu.edu

Professors: J. W. Bartley, K. B. Frazier, P. F. Williams; **Associate Professors:** B. C. Branson, F. A. Buckless, Y. A. Chen, K. A. Krawczyk, R. L. McClenny-Wright, R. B. Sawyers, G. J. Zuckerman; **Assistant Professors:** M. S. Beasley, B. A. Chaney, L. R. Ingraham, D. P. Pagach

The Master of Accounting (MAC) is a professional degree designed to prepare students for careers as public accountants, internal auditors or tax specialists. Graduates will be prepared to complete the CPA Examination.

Admission Requirements: Successful applicants typically have a Graduate Management Admissions Test (GMAT) score above 500 and a 3.0 minimum undergraduate GPA. The best-qualified applicants will be accepted up to the number of spaces available for new students. Exceptions to the minimum GPA and GMAT score may be made because of the consideration given to other relevant factors. Prerequisite courses for admission to the master's program include accounting and certain other courses that are the equivalent of those required for an undergraduate degree in accounting. Applicants may receive provisional admission prior to completion of the prerequisites, but will not be admitted to 500-level courses until prerequisites are completed. Complete information and application forms can be obtained from the MAC Director.

Master's Degree Requirements: A minimum of 6 (maximum of 9) non-ACC credits are required. The curriculum is designed to provide a broad-based professional education.

Other Relevant Information: Master's students must begin the degree program in the summer or in the fall semester. The program is designed for full-time students and no night classes are offered.

In order to assure that an application will be considered for the next fall semester,

all application forms, transcripts, applicable fees, resumes, letters of recommendation and other relevant material must be received no later than March 1.

GRADUATE COURSES

ACC 508 Advanced Commercial Law.
ACC 510 Advanced Financial Accounting.
ACC 515 Accounting Theory and Current Issues.
ACC 519 Integrated Accounting Practice.
ACC 521 Production Cost Analysis and Control.
ACC 525 Advanced Management Accounting.
ACC 530 Advanced Income Tax.
ACC 533 Accounting and Tax Research Methodology.
ACC 534 Taxation of Corporations and Shareholders.
ACC 535 Taxation of Partnerships and S Corporations.
ACC 536 Taxation of Estates, Trusts and Gifts.
ACC 537 Tax Planning and Business Strategy.
ACC 550 Assessing Risks of Information Technology.
ACC 551 Advanced Auditing.
ACC 552 Advanced Accounting Cases.
ACC 581 Survey of Financial Accounting.
ACC 582 Survey of Management Accounting.
ACC 588 Special Topics in Accounting.
ACC 630 Independent Study.

Adult and Community College Education

Degrees Offered: Ph.D., Ed.D., M.S., M.Ed.

GRADUATE FACULTY

Professor W. L. Deegan, *Head of the Department*
Professor J. C. Glass Jr., *Director of Graduate Programs*
Box 7801, (919) 515-6238

Joseph D. Moore Distinguished Professor G. A. Baker III

Professors: E. J. Boone, D. C. Locke, R. C. Serow, R. G. Taylor Jr., G. B. Vaughan; **Visiting Professor:** L. F. Harper; **Adjunct Professors:** J. A. Quinn, R. L. Swain; **Professors Emeriti:** M. P. Burt, G. L. Carter Jr., M. W. Hoover, E. MacPhail-Wilcox, D. R. Proctor; **Associate Professors:** H. D. Akroyd, P. F. Bitting, J. L. Burrow, R. Gillett-Karam, W. Y. Lee; **Assistant Professors:** D. L. Martin, J. M. Pettitt, S. W. Williams, A. L. Wilson; **Visiting Assistant Professors:**

D. J. Eaker-Rich, J. J. Hoey IV, D. C. Luckadoo, B. I. Mallette, R. E. Parries, I. M. Weisman; *Adjunct Assistant Professors*: P. J. Fairchild, M. F. Gast, B. M. Gorham, N. E. Hagan, E. S. Knott, D. L. Reichard, M. E. Ward

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: L. F. Bunn, R. D. Mustian, R. W. Shearon; *Associate Professor*: R. T. Liles

The department offers degrees in adult and community college education, higher education administration, training and development, educational research and policy analysis, and health occupations teacher education to meet the professional needs of administrators, supervisors, specialists and instructors in community colleges, four-year colleges and universities, business and industry, the professions and other adult education organizations. Program concentrations include adult and continuing education, community college leadership and higher education, and training and development.

Admission Requirements: In addition to Graduate School admission requirements, the Department requires supplemental evidence of qualifications. Specific information regarding admission can be obtained by contacting the Director of Graduate Programs.

Master's Degree Requirements: The M.S. and M.Ed. programs requires a minimum of 30 or 36 credit hours, respectively. A graduate course in statistics and a thesis are required for the M.S.

Doctoral Degree Requirements: The Ed.D. program requires extensive research work and may include participation in a supervised internship experience. The doctoral program must be completed within seven years from the date of admission. One academic year of full-time residency is required.

Student Financial Support: A few graduate assistantships may be available to students in this program.

Other Relevant Information: Students may concentrate in adult and continuing education (continuing professional education, educational gerontology), health occupations, four-year colleges and universities, community and technical colleges, and training and development.

GRADUATE COURSES

EAC 602 Seminar in Adult and Community College Education.

- EAC 624 Topical Problems in Adult and Community College Education.**
- EAC 640 Research Seminar in Adult and Community College Education.**
- EAC 641 Practicum in Health Occupations.**
- EAC 651 Internship in Adult and Community College Education.**
- EAC 685 Master's Supervised Teaching.**
- EAC 692 Master's Research Project.**
- EAC 693 Master's Supervised Research.**
- EAC 695 Master's Thesis Research.**
- EAC 699 Master's Thesis Preparation.**
- EAC 700 Community College and Two-year Postsecondary Education.**
- EAC 701 Administrative Concepts and Theories Applied to Adult and Community College Education.**
- EAC 703 The Programming Process in Adult and Community College Education.**
- EAC 704 Leadership in Higher and Community College Education.**
- EAC 705 Group Process in Adult and Community College Education.**
- EAC 706 The College and University Presidency.**
- EAC 707 The Politics of Higher Education.**
- EAC 708 Continuing Education for the Professions.**
- EAC 710 Adult Education: History, Philosophy, Contemporary Nature.**
- EAC 716 History of Higher Education in the United States.**
- EAC 717 Current Issues in Higher Education.**
- EAC 732 Health Care Delivery Systems and Environments.**
- EAC 735 Curriculum and Instruction in the Health Professions.**
- EAC 736 Issues and Trends in Education for the Health Professions.**
- EAC 737 The Extension and Public Service Function in Higher Education.**
- EAC 738 Instructional Strategies in Adult and Community College Education.**
- EAC 739 Educational Gerontology.**
- EAC 740 Extension in Developing Countries.**
- EAC 743 Adulthood and Learning: The Later Years.**
- EAC 745 Death and Dying: A Lifespan Issue.**
- EAC 749 Finance in Adult and Community College Education.**
- EAC 750 The Environment for Learning in Adult and Community College Education.**
- EAC 759 The Adult Learner.**
- EAC 767 Education of Special Adult Populations.**
- EAC 778 Law and Higher Education.**
- EAC 779 Concepts and Principles of Evaluation Applied to Non-formal Adult Education Programs.**
- EAC 780 Designing Instructional Systems in Training and Development.**
- EAC 781 Advanced Instructional Design in Training and Development.**
- EAC 782 Organization and Operation of Training and Development Programs.**
- EAC 783 Needs Assessment and Task Analysis in Training and Development.**

- EAC 784 Evaluating Training Transfer and Effectiveness.**
- EAC 785 Qualitative Research in Adult and Community College Education.**
- EAC 786 Methods and Techniques of Training and Development.**
- EAC 787 Organizational Concepts and Theories Applied to Adult and Community College Education.**
- EAC 788 Integrating Technology into Training Programs.**
- EAC 789 Marketing for Education and Training Programs.**
- EAC 790 Advanced Qualitative Research Methods.**
- EAC 802 Research Seminar in Adult and Community College Education.**
- EAC 803 Research Seminar in Adult and Higher Education.**
- EAC 824 Topical Problems in Adult and Community College Education.**
- EAC 841 Practicum In Health Occupations.**
- EAC 851 Internship in Adult and Community College Education.**
- EAC 885 Doctoral Supervised Teaching.**
- EAC 890 Doctoral Preliminary Examination.**
- EAC 892 Doctoral Research Project.**
- EAC 893 Doctoral Supervised Research.**
- EAC 895 Doctoral Dissertation Research.**
- EAC 899 Doctoral Dissertation Preparation.**

Aerospace Engineering

For a listing of graduate faculty and program information, see mechanical and aerospace engineering.

Agricultural and Extension Education

Degree Offered: M.S., Master of Agricultural and Extension Education

GRADUATE FACULTY

Professor R. W. Shearon, *Head of the Department*

Associate Professor R. T. Liles, *Director of Graduate Programs*

Box 7607, (919) 515-2819, richard_liles@ncsu.edu

Professors: G. W. Bostick Jr., D. M. Jenkins, G. E. Moore, R. D. Mustian;

Professor Emeritus: W. L. Carpenter; *Associate Professors:* J. L. Flowers, L. R. Jewell, B. M. Kirby; *Extension Associate:* J. D. Gibson

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: J. M. Groff, T. T. McKinney

The agricultural and extension education program provides for advanced study for professionals in agricultural education, extension education or related careers. Programs of study may be designed to meet the individual needs of the student. Courses may be selected that lead to advanced teacher licensure in agriculture or an emphasis in extension education leading to advancement in careers in the Cooperative Extension Service. Additional specialization in the student's teaching or extension field is provided through a minor or advised elective courses.

Admission Requirements: In addition to the Graduate School admission requirements, the department requires either GRE or the Miller's Analogies Test (MAT) scores (M.S. only), three positive references, and a statement of career goals and/or research interests. An interview (personal or by telephone) may be required.

Master's Degree Requirements: The department offers an M. S. degree, which requires a thesis for which the student receives six hours of credit and a Master of Agricultural and Extension Education as a non-thesis track. In addition, an M.Ed. degree in agricultural education is available through the Department of Curriculum and Instruction. All master's degree programs require a total of 36 credit hours. Minors are optional but, if selected, require a minimum of nine credit hours.

Doctoral Degree Requirements: Doctoral programs with specializations in agricultural and extension education are offered through the Department of Adult and Community College Education and through the occupational education program.

Student Financial Support: A limited number of research and/or teaching assistantships are available on a competitive basis. Other financial aid is available on a competitive basis from the Graduate School.

GRADUATE COURSES

- AEE(ED) 501 Foundations of Agricultural and Extension Education.
- AEE 522 Occupational Experience in Agriculture.
- AEE 523 Adult Education in Agriculture.
- AEE 524 Agricultural Occupations.
- AEE(ED) 530 Priority Management in Agricultural and Extension Education.
- AEE 534 Supervision in Agricultural Education.
- AEE 595 Special Topics in Agricultural and Extension Education.
- AEE 601 Seminar.
- AEE 610 Special Topics.
- AEE 611 Special Topics in Agricultural Communications.
- AEE 620 Special Problems.
- AEE(ED) 641 Practicum in Agricultural and Extension Education.
- AEE 685 Master's Supervised Teaching.

AEE 690 Master's Examination.
AEE 693 Master's Supervised Research.
AEE 695 Master's Thesis Research.
AEE 699 Master's Thesis Preparation.
AEE 721 Planning Programs in Agricultural Education.
AEE(ED) 735 Effective Teaching in Agriculture and Life Sciences.
AEE 820 Special Problems.
AEE(ED) 841 Practicum in Agricultural and Extension Education.
AEE 885 Doctoral Supervised Teaching.
AEE 893 Doctoral Supervised Research.
AEE 895 Doctoral Dissertation Research.
AEE 899 Doctoral Dissertation Preparation.

Agricultural and Resource Economics

For a listing of graduate faculty and program information, see economics.

Agricultural Education

For a listing of graduate faculty and program information, see agricultural and extension education for the Master of Science degree and curriculum and instruction for the Master of Education in agricultural education degree.

Animal Science

Degrees Offered: Ph.D., M.S., Master of Animal Science

GRADUATE FACULTY

Professor K. L. Esbenshade, *Head of the Department*

William Neal Reynolds Professor E. J. Eisen, *Director of Graduate Programs*
 Box 7621, (919) 515-4017, gene_eisen@ncsu.edu

Professors: L. S. Bull, K. R. Butcher, E. V. Caruolo, J. C. Cornwell, R. G. Crickenberger, R. L. McCraw, R. M. Petters, O. W. Robison, J. W. Spears, L. W. Whitlow; *Professors Emeriti:* R. F. Behlow, D. G. Davenport, R. W. Harvey, W. L. Johnson, E. E. Jones, J. R. Jones, C. A. Lassiter, J. M. Leatherwood, J. G. Lecce, C. L. Markert, R. D. Mochrie, R. M. Myers, A. H. Rakes, H. A. Ramsey, F. D. Sargent, F. H. Smith, L. C. Ulberg, J. C. Wilk; *Associate Professors:* B. P. Alston-Mills, J. H. Eisemann, C. E. Farin, W. L. Flowers, B. A. Hopkins, W. E. M. Morrow, J. Odle, M. H. Poore, M. T. See, S. P. Washburn; *Visiting*

Associate Professor: G. G. Gomez; **Adjunct Associate Professor:** M. T. Coffey; **Associate Professors Emeriti:** E. U. Dillard, J. J. McNeill; **Assistant Professors:** R. J. Harrell, G. B. Huntington, M. T. See, C. S. Whisnant, E. van Heugten; **Visiting Assistant Professors:** S. L. Ash, J. A. Moore

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: J. H. Britt, W. M. Hagler Jr., D. K. Larick; **Professor (USDA):** J. C. Burns; **Associate Professors:** G. W. Almond, G. A. Benson, M. D. Whitacre; **Assistant Professors:** J.-M. Luginbuhl, C. M. Williams

Animal science offers an opportunity for training in a diversity of basic sciences and the integration of such knowledge into the framework of a living system. Students may major or co-major in animal science or one of the following disciplines: biochemistry, genetics, microbiology, nutrition, physiology or statistics. Students may also concentrate in management and production areas.

Admission Requirements: Factors considered for admission include: grade point average, scores on the GRE (for M.S. and Ph.D. applicants), undergraduate courses, letters of recommendation and a member of the Animal Science Department faculty willing to serve as the applicant's advisor.

Master of Science: The minor is optional but external faculty representation is not required on the advisory committee.

Doctoral Degree Requirements: Majors in animal science do not have specific course requirements. Each student's course program is developed in consultation with the Ph.D. advisory committee. The minor is optional but external faculty representation is required on the advisory committee.

Student Financial Support: The department offers a limited number of half-time research assistantships on a competitive basis. To be eligible for support, applicants must have a minimum grade point average of 3.2.

Other Relevant Information: To provide an opportunity for students to develop their teaching skills, all graduate students are required to assist in the departmental teaching program, regardless of source of financial support.

GRADUATE COURSES

ANS(NTR) 516 Animal Nutrition Research Methods.

ANS(CBS,PHY,ZO) 602 Seminar in Biology of Reproduction.

ANS 610 Special Topics.

ANS 685 Master's Supervised Teaching.
 ANS 690 Master's Examination.
 ANS 693 Master's Supervised Research.
 ANS 695 Master's Thesis Research.
 ANS 699 Master's Thesis Preparation.
 ANS 700 Advanced Ruminant Nutrition.
 ANS(PHY) 702 Reproductive Physiology of Mammals.
 ANS 706 Mammalian Embryo Manipulation.
 ANS(GN) 708 Genetics of Animal Improvement.
 ANS 710 Advanced Livestock Management.
 ANS(GN) 713 Quantitative Genetics and Breeding.
 ANS 720 Livestock Production in Warm Climates.
 ANS(CBS,NTR,PHY) 764 Comparative Physiology of the Digestive System.
 ANS(NTR,PO) 775 Mineral Metabolism.
 ANS(PHY) 780 Mammalian Endocrinology.
 ANS(CBS,PHY,ZO) 802 Seminar in Biology of Reproduction.
 ANS 810 Special Topics.
 ANS 885 Doctoral Supervised Teaching.
 ANS 890 Doctoral Preliminary Examination.
 ANS 893 Doctoral Supervised Research.
 ANS 895 Doctoral Dissertation Research.
 ANS 899 Doctoral Dissertation Preparation.

Applied Mathematics

For a listing of graduate faculty and program information, see mathematics.

Architecture

Degrees Offered: Master of Architecture

GRADUATE FACULTY

Professor F. A. Rifki, *Head of the Department*

Professor J. P. Rand, *Director of Graduate Programs*

Box 7701, (919) 515-7114, carbuckle@unity.ncsu.edu

Graduate Alumni Distinguished Professor: H. Sanoff

Professors: P. Batchelor, R. P. Burns Jr., R. H. Clark, M. J. Malecha, J. W. Place, P. Tesar; *Visiting Professors:* E. F. Harris Jr.; *Professors Emeritus:* J. P. Reuer; *Associate Professors:* F. C. Harmon, J. O. Tector; *Associate Professor*

Emeritus: D. W. Barnes Jr.; **Assistant Professors:** S. L. Roe, R. L. Spears;
Visiting Assistant Professor: I. D. Fatea

The Department of Architecture offers three tracks to the Master of Architecture degree: Track 1 is for applicants with a four-year undergraduate degree in architecture and may be completed in two years of full-time study. Track 2 is for applicants holding a five-year NAAB-accredited Bachelor of Architecture degree and normally requires three semesters in residence. Track 3 is for students with degrees in fields other than architecture. This track normally requires four semesters of preparatory work before entering the final two-year program of graduate study. Some applicants with design-related academic or professional experience may be able to complete the preparatory work in less than four semesters. Curriculum requirements for the M.Arch. degree are held to a minimum in order to permit students the necessary flexibility to achieve individual educational and professional goals.

A variety of courses are available within the Department of Architecture in urban and community design, architectural history and theory, methods and programming, architectural conservation, professional practice, building technology and environmental systems.

Admission Requirements

In addition to documents required by the Graduate School, students apply to the Master of Architecture program by submitting the following documents by January 15: 1. Personal Data form; 2. GRE scores (Track 3 applicants only); 3. Portfolio; 4. Statement of purpose. Applicants will be considered on an individual basis. Exceptions to Graduate School policy may be made for students indicating other qualifications and professional experience.

Master's Degree Requirements

The department stipulates the minimum course credits based on educational and professional goals to individualize a plan of study.

Student Financial Support

There are limited provisions for tuition remission permitting out-of-state students to pay in-state tuition. The department awards a number of teaching and research assistantships on the basis of ability and need, and applications are available from the graduate secretary. Students are also encouraged to apply for competitive national fellowships.

GRADUATE COURSES

ARC 501 Professional Architecture Studio I.

ARC 502 Professional Architecture Studio II.

ARC 503 Advanced Architectural Design (Series).
 ARC 531 The Chair as an Architectural Artifact.
 ARC 543 Analysis of Precedent.
 ARC 544 Architectural Conservation.
 ARC 546 Theory of Building Types.
 ARC 551 Design Methods and Programming.
 ARC 561 The Practice of Architecture.
 ARC 570 Anatomy of the City.
 ARC 571 Urban Housing.
 ARC 573 Environmental Perception.
 ARC 574 Place and Place Making.
 ARC 575 Participatory Design in Architecture.
 ARC 581 Project Preparation Seminar.
 ARC 589 Architectural Travel Study II.
 ARC 598 Final Project Studio in Architecture.
 ARC 610 Special Topics.
 ARC 630 Independent Study.
 ARC 676 Special Project.
 ARC 697 Final Research Project.

Biochemistry

Degrees Offered: Ph.D., M.S., Master of Biochemistry

GRADUATE FACULTY

Professor D. T. Brown, Head of the Department

Box 7622, 919-515-5802, dbrown@bchserver.bch.ncsu.edu

University Professor: E. C. Theil

William Neal Reynolds Professor: W. L. Miller

Professors: P. F. Agris, E. S. Maxwell, J. D. Otvos, E. C. Sisler, P. L. Wollenzien; *Adjunct Professors:* K. S. Korach; *Professors Emeriti:* F. B. Armstrong, L. W. Aurand, H. R. Horton, J. S. Kahn, I. S. Longmuir; *Associate Professors:* L. K. Hanley-Bowdoin, C. C. Hardin, C. L. Hemenway, J. A. Knopp

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: H. M. Hassan, J. W. Moyer, D. E. Sayers, R. R. Sederoff, H. E. Swaisgood, G. W. Winston

The graduate program in biochemistry is designed to prepare individuals for careers in research and teaching. Emphasis is primarily focused on laboratory research, where graduate students work closely with faculty. The department is well equipped to conduct research in biochemistry, biophysics, molecular biology and molecular genetics.

Admission Requirements: Students entering the graduate program in biochemistry should have a bachelor's degree in biochemistry, chemistry or a related physical or biological science, including undergraduate courses in organic chemistry, calculus, physics and one year of physical chemistry, as well as biochemistry/molecular biology.

Master of Science Degree Requirements: Up to 6 of the 30 credits required may be earned in laboratory rotations (BCH 670) and thesis research (BCH 695). On average, completion of the M.S. degree requires 2 to 3 years.

Doctoral Degree Requirements: Requirements for the Ph.D. degree include a minimum of 30 credit hours in course work and thesis research, including at least two advanced courses in biochemistry/ molecular biology; teaching experience. Formal course work may be completed within three semesters; on average, completion of the Ph.D. degree requires 5 years.

Student Financial Support: The department endeavors to meet the financial needs of students accepted into its doctoral program. Essentially all admitted students are offered the opportunity to apply for graduate teaching and research assistantships.

Other Relevant Information: The Department of Biochemistry is jointly administered by the Colleges of Agriculture and Life Sciences and Physical and Mathematical Sciences. The department, committed to a strong research environment, interacts with other life science departments on campus as well with the other research universities and institutes of the Research Triangle area.

GRADUATE COURSES

BCH 552 Experimental Biochemistry.

BCH 553 Metabolism and Molecular Biology.

BCH 601 Seminar.

BCH 610 Special Topics.

BCH 615 Advanced Special Topics.

BCH(TOX) 660 Free Radicals in Toxicology.

BCH 670 Laboratory Rotations.

BCH 685 Master's Supervised Teaching.

BCH 690 Master's Examination.

BCH 693 Master's Supervised Research.
 BCH 695 Master's Thesis Research.
 BCH 699 Master's Thesis Preparation.
 BCH 701 Macromolecular Structure.
 BCH 703 Macromolecular Synthesis and Regulation.
 BCH 705 Molecular Biology of the Cell.
 BCH 751 Biophysical Chemistry.
 BCH(GN) 761 Advanced Molecular Biology of the Cell.
 BCH 763 Biochemistry of Hormone Action.
 BCH(GN) 768 Nucleic Acids: Structure and Function.
 BCH 801 Seminar.
 BCH 810 Special Topics.
 BCH 815 Advanced Special Topics.
 BCH(TOX) 860 Free Radicals in Toxicology.
 BCH 870 Laboratory Rotations.
 BCH 885 Doctoral Supervised Teaching.
 BCH 890 Doctoral Preliminary Examination.
 BCH 893 Doctoral Supervised Research.
 BCH 895 Doctoral Dissertation Research.
 BCH 899 Doctoral Dissertation Preparation.

Biological and Agricultural Engineering

Degrees Conferred: Ph.D., M.S., Master of Biological and Agricultural Engineering

GRADUATE FACULTY

Professor D. B. Beasley, Head of the Department

Professor J. H. Young, Director of Graduate Programs

Box 7625, (919) 515-6714, jim_young@ncsu.edu

Distinguished University Professor, William Neal Reynolds Professor and Graduate Alumni Distinguished Professor: R. W. Skaggs

Professors: C. F. Abrams Jr., J. C. Barker, R. W. Bottcher, C. G. Bowers Jr., F. J. Humenik, E. G. Humphries, G. J. Kriz, W. F. McClure, R. P. Rohrbach, A. R. Rubin, R. S. Sowell, L. F. Stikeleather, P. W. Westerman, D. H. Willits; Professor (USDA): T. B. Whitaker; Adjunct Professor: L. M. Safley; Professors Emeriti: H. D. Bowen, J. W. Dickens, L. B. Driggers, W. H. Johnson, F. M. Richardson, R. E. Sneed, C. W. Suggs, E. H. Wiser; Associate Professors: G. R. Baughman, S. M. Blanchard, M. D. Boyette, R. O. Evans Jr., R. L. Huffman, G. D. Jennings, J. E. Parsons; Visiting Associate Professors: G. T. Roberson, J. D.

Spooner; *Assistant Professors:* J. J. Classen, S. A. Hale; *Senior Researcher:* S. C. Mohapatra

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: A. E. Hassan, T. W. Rufty Jr., K. R. Swartzel; *Associate Professors:* T. M. Losordo, S. C. Roe; *Assistant Professor:* B. E. Farkas

Course offerings or research facilities are available in the following areas: bio-instrumentation, biomechanics, human engineering, bioprocessing, food packaging and processing, biological systems modeling, aquaculture, hydrology, water table management, ground water management, animal waste management, non-point source pollution, power and machinery, soil and water, structures and environment, food and process engineering, electrical and electronic systems, forest mechanization, robotics and machine vision.

Admission Requirements: A baccalaureate in biological or agricultural engineering or the equivalent is the preferred prerequisite for admission. Those with strong academic background in the physical or biological sciences may also be admissible with a requirement for certain additional background undergraduate work. In the case of applicants with master's degrees, a master's GPA of at least 3.2 is required for admission. Exceptions to the overall undergraduate GPA requirements may be made for cases where performance in the major or during the last two years was at or above the 3.00 level.

GRE scores are recommended for those with academic performance records near the minimal level. Applicants without engineering degrees from domestic accredited institutions must submit GRE scores to be considered for admission. Admission decisions are made by a faculty review committee. The best-qualified applicants will be accepted up to the number of spaces available for new students.

Master's Degree Requirements: (M.BAE): This non-thesis degree requires 33 hours of approved graduate course work and a directed special project which must comprise from 3-6 hours credit. A minor is required. (M.S.): A minor is required.

Doctoral Degree Requirements: Course hour requirements are flexible but typically include at least 36 hours beyond a master's degree. Direct admission without a master's is possible in exceptional cases. A minor is required.

Student Financial Support: Graduate assistantships are available to students in this program on a competitive basis.

GRADUATE COURSES

- BAE 501 Instrumentation and Control for Biological Systems.
- BAE(CBS) 522 Mechanics of Biological Materials.
- BAE 572 Irrigation and Drainage.
- BAE(SSC) 573 Hydrologic and Water Quality Modeling.
- BAE 590 Special Topics in Biological and Agricultural Engineering.
- BAE 601 Seminar.
- BAE 610 Special Topics.
- BAE 620 Special Problems.
- BAE 685 Master's Supervised Teaching.
- BAE 690 Master's Examination.
- BAE 693 Master's Supervised Research.
- BAE 695 Master's Thesis Research.
- BAE 699 Master's Thesis Preparation.
- BAE 752 Instrumentation for Agricultural Research and Processing.
- BAE(CE) 578 Agricultural Waste Management.
- BAE(SSC) 771 Theory of Drainage--Saturated Flow.
- BAE(SSC) 774 Theory of Drainage--Unsaturated Flow.
- BAE(SSC) 780 Transport and Fate of Chemicals in Soils and Natural Waters.
- BAE(FS) 785 Food Rheology.
- BAE 790 Special Topics in Biological and Agricultural Engineering.
- BAE 801 Seminar.
- BAE 810 Special Topics.
- BAE 820 Special Problems.
- BAE 885 Doctoral Supervised Teaching.
- BAE 890 Doctoral Preliminary Examination.
- BAE 893 Doctoral Supervised Research.
- BAE 895 Doctoral Dissertation Research.
- BAE 899 Doctoral Dissertation Preparation.

Biomathematics

Degrees Offered: Ph.D., M.S., Master of Biomathematics

GRADUATE FACULTY

Professor K. H. Pollock, *Director of Graduate Programs*

Box 8203, (919) 515-1957, pollock@stat.ncsu.edu

Professors: H. T. Banks, J. W. Bishir, S. P. Ellner, J. F. Gilliam, T. Johnson, D. W. Nychka, H. E. Schaffer, J. F. Selgrade, R. E. Stinner, G. G. Wilkerson;

Adjunct Professors: L. B. Crowder, P. H. Morgan; *Associate Professors:* M. J.

Groom, B. G. Fitzpatrick, T. B. Kepler, C. E. Smith, H. T. Tran; *Assistant Professors*: G. R. Hess, S. R. Lubkin, J. L. Thorne; *Adjunct Assistant Professors*: P. M. Dixon, J. S. Kimbell, M. W. Lutz

Biomathematics is an interdisciplinary graduate program offering courses and research opportunities in basic and applied mathematical biology. Degree programs are flexible to accommodate students with backgrounds in the biological, mathematical or physical sciences. The program also offers Ph.D. and master's-level minors. A brochure with additional information on requirements, courses, faculty and current research can be obtained by writing the program director.

Admission Requirements: Applicants should have either a bachelor's degree in biology with evidence of aptitude and interest in mathematics, or a bachelor's in a mathematical science with evidence of aptitude and interest in biology. Advanced (multivariate) calculus, linear algebra and general biology are prerequisites for all BMA courses, and deficiencies in these should be remedied during the first year of graduate study. The application must include a narrative statement (1-2 pages) of the applicant's goals and reasons for interest in the BMA program.

Master's Degree Requirements: The M.S. and M.BMA. degrees require BMA 567 or 774, 771-772; 2 upper-level biology courses; and 3 courses from the mathematical sciences or statistical sciences. The M.S. degree requires a thesis, and the M.BMA. requires two additional courses and a written project.

Doctoral Degree Requirements: Course requirements consist of a "core" and a "concentration" in some area of biology or mathematical sciences. Core requirements are: BMA 771-772, 773 and 774; 3 upper-level biology courses from at least two areas (*e.g.*, physiology and evolution); and additional courses from the mathematical or statistical sciences. Concentration consists of either a Ph.D. co-major in a biological or mathematical science or a coherent series of 5 graduate courses approved by the student's committee, which must include a two-semester sequence and at least one 700-level course.

Financial Assistance: TAs (generally in the Department of Statistics), RAs and internships are available. Awards are based on GRE scores, transcripts and letters of recommendation. RAs usually are held by continuing students. To receive full consideration for financial aid, the completed application must be received by March 1.

Other Relevant Information: All students are required to participate in the BMA Graduate Seminar. Course requirements can be met by examination or by demonstrating that an equivalent course was completed at another university.

GRADUATE COURSES

BMA 567 Modeling of Biological Systems.
BMA 573 Mathematical and Experimental Modeling of Physical Processes I.
BMA 574 Mathematical and Experimental Modeling of Physical Processes II.
BMA 610 Special Topics.
BMA 685 Master's Supervised Teaching.
BMA 690 Master's Examination.
BMA 693 Master's Supervised Research.
BMA 695 Master's Thesis Research.
BMA 699 Master's Thesis Preparation.
BMA(OR,ST) 722 Decision Analytic Modeling.
BMA(MA,ST) 771 Biomathematics I.
BMA(MA,ST) 772 Biomathematics II.
BMA(MA,OR,ST) 773 Stochastic Modeling.
BMA(OR) 774 System Modeling Theory.
BMA 801 Seminar
BMA 815 Advanced Special Topics.
BMA 885 Doctoral Supervised Teaching.
BMA 890 Doctoral Preliminary Examination.
BMA 893 Doctoral Supervised Research.
BMA 895 Doctoral Dissertation Research.
BMA 899 Doctoral Dissertation Preparation.

Botany

Degrees Offered: Ph.D., M.S., Master of Botany

GRADUATE FACULTY

Professor E. Davies, *Head of the Department*

Professor N. S. Allen, *Director of Graduate Programs*

Box 7612, (919) 515-2727, nina_allen@ncsu.edu

University Research Professor: W. F. Thompson

Professors: U. Blum, W. F. Boss, R. S. Boston, J. M. Burkholder, W. S. Cilton, R. C. Fites, J. F. Thomas, C. G. Van Dyke, T. R. Wentworth; *Professor (USDA):* H. E. Pattee; *Professors Emeriti:* C. E. Anderson, R. J. Downs, J. W. Hardin, W. W. Heck, R. L. Mott, G. R. Noggle, E. D. Seneca, J. R. Troyer; *Associate Professors:* R. L. Beckmann, J. E. Mickle, D. Robertson, J. M. Stucky; *Adjunct Associate Professor:* C. S. Brown; *Assistant Professor:* L. A. Johnson

ASSOCIATED MEMBERS OF THE PROGRAM

Professors: M. M. Goodman, T. W. Rufty Jr., E. C. Sisler, E. A. Wheeler;
Professor (USDA): S. C. Huber; **Associate Professors:** H. V. Amerson, M. J. Groom; **Research Associate Professor:** R. W. Whetten; **Associate Professor (USDA):** K. O. Burkey; **Assistant Professor:** M. D. Purugganan

Course offerings or research facilities are available in the following areas: molecular biology, cell biology and physiology of development; calcium, the cytoskeleton and signal transduction; biochemistry of crown gall; physiological ecology of freshwater, marine and terrestrial plants; community ecology; wetland plants; plant systematics; ultrastructure.

Admission Requirements: In special situations, students with an undergraduate GPA of less than 3.00 (on a 4.00 scale) may be admitted provisionally. If students lack certain prerequisites (e.g., in mathematical, chemical, biological or other areas), additional courses may be required that do not qualify for graduate credit. The best qualified students will be accepted when spaces are available for new students.

Master's and Doctoral Degree Requirements: Courses from each of the two sub-disciplines (cell and molecular biology and ecology biodiversity) are required. Students must earn a letter grade of at least a "B" in these courses. Other requirements include: a graduate statistics course, a thesis (for the Ph.D. and M.S., but not the Master of Botany), a comprehensive examination (Ph.D.), oral thesis defense and a one-semester teaching responsibility per degree.

Other Relevant Information: Graduate research and teaching assistantships and tuition remission information are available from the department. Graduate students are expected to attend and participate in the seminar program every semester they are in residence. The department is host to several training grants in plant cell and molecular biology founded by the Tri-Agency (NSF,DOE,USDA) and NASA.

GRADUATE COURSES

BO(MB,PP) 501 Fungi and Their Interaction with Plants.

BO 601 Botany Seminar.

BO 620 Special Problems.

BO 624 Topical Problems.

BO 685 Master's Supervised Teaching.

BO 690 Master's Examination.

BO 693 Master's Supervised Research.

BO 695 Master's Thesis Research.

BO 699 Master's Thesis Preparation.

BO 710 Plant Anatomy.
 BO 712 Plant Morphogenesis.
 BO(CS,HS) 718 Biological Control of Weeds.
 BO(PP) 721 Advanced Mycology.
 BO 722 Advanced Morphology and Phylogeny of Seed Plants.
 BO(GN,MB,PP) 730 Fungal Genetics and Physiology.
 BO 731 Water Relations of Plants.
 BO 733 Plant Growth and Development.
 BO 744 Plant Geography.
 BO 745 Paleobotany.
 BO 751 Advanced Plant Physiology I.
 BO 752 Advanced Plant Physiology II.
 BO 754 Laboratory in Advanced Plant Physiology II.
 BO(ZO) 760 Principles of Ecology.
 BO 761 Physiological Ecology.
 BO 762 Applied Coastal Ecology.
 BO 765 Plant Community Ecology.
 BO(ZO) 770 Advanced Topics in Ecology I.
 BO(MB) 774 Phycology.
 BO(MB,PP) 775 The Fungi.
 BO(MB,PP) 776 The Fungi--Lab.
 BO 780 Plant Molecular Biology.
 BO 801 Botany Seminar.
 BO 820 Special Problems.
 BO 824 Topical Problems.
 BO 885 Doctoral Supervised Teaching.
 BO 890 Doctoral Preliminary Examination.
 BO 893 Doctoral Supervised Research.
 BO 895 Doctoral Dissertation Research.
 BO 899 Doctoral Dissertation Preparation.

Chemical Engineering

Degrees Offered: Ph.D, M.S., Master of Chemical Engineering

GRADUATE FACULTY

Hoechst-Celanese Professor and Graduate Alumni Distinguished Professor R. G. Carbonell, Head of the Department

Distinguished University Professor D. F Ollis, Director of Graduate Programs
 Box 7905, (919) 515-2324, ollis@eos.ncsu.edu

Camille Dreyfus Professor: H. B. Hopfenberg

Hoechst-Celanese Professor: R. M. Felder

Mary Ann Smith Professor J. M. DeSimone

Professors: K. J. Bachmann, P. S. Fedkiw, C. K. Hall, R. M. Kelly, P. K. Kilpatrick, P. K. Lim, M. R. Overcash, G. W. Roberts, C. J. Setzer; **Adjunct Professors:** I. Pinnau, J. Preston; **Professors Emeriti:** J. K. Ferrell, D. B. Marsland, A. S. Michaels, V. T. Stannett; **Associate Professors:** B. D. Freeman, C. S. Grant, S. A. Khan, H. H. Lamb, G. N. Parsons, S. W. Peretti, H. M. Winston; **Adjunct Associate Professors:** P. M. Schlosser, J. J. Spivey, J. L. Williams; **Assistant Professor:** C. S. Grant; **Adjunct Assistant Professor:** R. T. Chern

ASSOCIATE MEMBERS OF THE PROGRAM

Professor: H. Jameel; **Adjunct Professor:** T. W. Joyce; **Associate Professor:** C. M. Balik

Research activities in the department include: biochemical engineering, catalysis and reaction engineering, computer-aided design and manufacturing, electronic materials, electrochemical engineering, environmental engineering; polymer science and engineering, thermodynamics and computer simulation, and transport phenomena.

Admissions Requirements: Students admitted to the graduate program normally have a bachelor's degree in chemical engineering or its equivalent. Students with undergraduate degrees in chemistry, physics or other engineering disciplines may be admitted but will be required to make up undergraduate course work deficiencies in chemical engineering without graduate credit. The most promising candidates will be accepted up to the number of spaces available.

Master of Science Degree Requirements: A set of 5 core courses is strongly recommended. The thesis must be defended in a final public oral examination.

Master of Chemical Engineering Degree Requirements: A 3-credit project is required. A set of 5 core courses is strongly recommended.

Doctor of Philosophy Degree Requirements: Students normally take a set of 5 core courses, two advanced chemical engineering courses and at least 6 credits of dissertation research. A thesis is required; this must be defended in a final public oral examination. In addition, the candidate must: (1) submit and defend an original written proposition in any area of chemical engineering, and (2) submit and defend a proposal to perform his/her thesis research.

GRADUATE COURSES

- CHE 525 Process System Analysis and Control.**
- CHE(OR) 527 Optimization of Engineering Processes.**
- CHE 543 Polymer Science and Technology.**
- CHE 546 Design and Analysis of Chemical Reactors.**
- CHE 551 Biochemical Engineering.**
- CHE 560 Chemical Processing of Electronic Materials.**
- CHE 565 Diffusion in Polymers.**
- CHE(NE) 585 Management of Hazardous Chemical and Radioactive Wastes.**
- CHE 596 Special Topics.**
- CHE 597 Special Prejects.**
- CHE 601 Seminar.**
- CHE 685 Master's Supervised Teaching.**
- CHE 690 Master's Examination.**
- CHE 693 Master's Supervised Research.**
- CHE 695 Master's Thesis Research.**
- CHE 699 Master's Thesis Preparation.**
- CHE 711 Chemical Engineering Process Modeling.**
- CHE 713 Thermodynamics I.**
- CHE 714 Thermodynamics II.**
- CHE 715 Transport Phenomena I.**
- CHE 716 Transport Phenomena II.**
- CHE 717 Chemical Reaction Engineering.**
- CHE 718 Advanced Chemical Reaction Engineering.**
- CHE 719 Electrochemical Systems Analysis.**
- CHE 721 Separation Processes.**
- CHE 752 Separation Processes for Biological Materials.**
- CHE 760 Photochemical Engineering: Fundamentals and Applications.**
- CHE(TC) 769 Polymers, Surfactants and Colloidal Materials.**
- CHE 779 Diffusion in Polymers.**
- CHE 796 Special Topics in Chemical Engineering.**
- CHE 797 Chemical Engineering Projects.**
- CHE 798 Advanced Chemical Engineering Projects.**
- CHE 801 Seminar.**
- CHE 885 Doctoral Supervised Teaching.**
- CHE 890 Doctoral Preliminary Examination.**
- CHE 893 Doctoral Supervised Research.**
- CHE 895 Doctoral Dissertation Research.**
- CHE 899 Doctoral Dissertation Preparation.**

Chemistry

GRADUATE FACULTY

Degrees Offered: Ph.D., M.S., Master of Chemistry

Professor R. A. Osteryoung, Head of the Department

Professor R. J. Linderman, Director of Graduate Programs

Box 8204, (919) 515-2548, russell_linderman@ncsu.edu

Glaxo Distinguished University Professor: J. S. Lindsey

Professors: A. J. Banks, R. D. Bereman, E. F. Bowden, L. H. Bowen, C. L. Bumgardner, H. H. Carmichael, D. L. Comins, K. W. Hanck, F. C. Hentz Jr., M. G. Khaledi, S. G. Levine, C. G. Moreland, J. G. Osteryoung, S. T. Purrington, A. F. Schreiner, E. O. Stejskal, G. H. Wahl Jr., M. H. Whangbo, J. L. Whitten; *Professors Emeriti:* L. D. Freedman, F. W. Getzen, Z. Z. Hugus Jr., R. H. Loeppert, W. P. Tucker; *Associate Professors:* C. B. Boss, T. C. Caves, Y. Ebisuzaki, D. A. Shultz, W. L. Switzer, D. W. Wertz; *Assistant Professors:* C. R. Cornman, C. B. Gorman, J. D. Martin, B. Wang; *Visiting Assistant Professor:* C. A. Haney

ASSOCIATE MEMBER OF THE PROGRAM

Professor: J. D. Otvos

The Department of Chemistry offers programs of study leading to the Doctor of Philosophy, Master of Science and Master of Chemistry degrees. The Ph.D. and M.S. degrees are based on original research, while the Master of Chemistry degree is a non-research degree. Many research projects merge disciplines such as biochemistry, computational science, materials science, physics, statistics and toxicology with chemistry. General courses as well as advanced and special topics courses are offered.

Admission Requirements: Applicants should have an undergraduate degree in chemistry or in a closely related field with a strong chemistry background. A GPA of at least 3.0 in the sciences is needed for consideration. GRE General Test scores are strongly recommended, and the Subject Test is recommended. Admission decisions are made as completed applications are received. For most favorable consideration for the fall term, all application materials should be received by March 1; for spring admission, by August 15.

Master's Degree Requirements: The requirements for a Master of Chemistry degree are 27 hours of course work, 3 hours of a critical review paper and an oral examination on the review paper. Students in this program should have present or past experience in a research laboratory. The M.S. degree in chemistry requires 27 hours of course work and research leading to completion of a thesis.

Doctoral Degree Requirements: In the doctoral program, emphasis is placed on original research and a comprehensive knowledge of one's chosen field.

Student Financial Support: Incoming graduate students are supported by departmental teaching assistantships. Outstanding applicants are eligible for supplemental fellowships during their first year of study. Research assistantships are normally available to second-, third-, and fourth-year students. The department also has fellowships for students interested in the area of electronic materials and fellowships for students interested in pharmaceutical and synthetic organic chemistry.

Other Relevant Information: The Department of Chemistry is one of five academic departments in the College of Physical and Mathematical Sciences. Several new faculty have been added in the last few years, thereby enhancing opportunities for graduate research.

GRADUATE COURSES

CH 601 Seminar.

CH 610 Special Topics.

CH 615 Advanced Special Topics.

CH 677 Advanced Chemistry Projects.

CH 685 Master's Supervised Teaching.

CH 690 Master's Examination.

CH 693 Master's Supervised Research.

CH 695 Master's Thesis Research.

CH 699 Master's Thesis Preparation.

CH 701 Advanced Inorganic Chemistry I.

CH 703 Advanced Inorganic Chemistry II.

CH 705 Physical Methods in Inorganic Chemistry.

CH(MAT) 707 Chemical Concepts in Materials Science and Engineering.

CH 711 Advanced Analytical Chemistry I.

CH 713 Advanced Analytical Chemistry II.

CH 714 Electronics and Instrumentation Laboratory.

CH 715 Chemical Instrumentation.

CH 717 Physical Methods of Elemental Trace Analysis.

CH 718 Trace Analysis Laboratory.

CH 721 Advanced Organic Chemistry I.
 CH 723 Advanced Organic Chemistry II.
 CH 725 Physical Methods in Organic Chemistry.
 CH 727 Mass Spectrometry.
 CH 730 Advanced Physical Chemistry.
 CH 731 Chemical Thermodynamics I.
 CH 733 Chemical Kinetics.
 CH 736 Chemical Spectroscopy.
 CH 737 Quantum Chemistry.
 CH 739 Colloid Chemistry.
 CH 741 Analytical Spectroscopy.
 CH 743 Electrochemistry.
 CH 745 Chemical Separation.
 CH 755 Organic Reaction Mechanisms.
 CH 757 Chemistry of Metal-organic Compounds.
 CH 759 Natural Products.
 CH(MAT,TC) 762 Physical Chemistry of High Polymers--Bulk Properties.
 CH(MAT,TC) 772 Physical Chemistry of High Polymers--Solution Properties.
 CH 801 Seminar.
 CH 810 Special Topics.
 CH 815 Advanced Special Topics.
 CH 877 Advanced Chemistry Projects.
 CH 885 Doctoral Supervised Teaching.
 CH 890 Doctoral Preliminary Examination.
 CH 893 Doctoral Supervised Research.
 CH 895 Doctoral Dissertation Research.
 CH 899 Doctoral Dissertation Preparation.

Civil Engineering

Degrees Offered: Ph.D., M. S., Master of Civil Engineering

GRADUATE FACULTY

Professor E. D. Brill Jr., *Head of the Department*

Professor D. W. Johnston, *Director of Graduate Programs*

Box 7908, (919) 515-7344, johnston@eos.ncsu.edu

Distinguished Professor: J. M. Hanson

Professors: S. H. Ahmad, R. C. Borden, R. H. Borden, J. S. Fisher, C. G. Gilbert, A. K. Gupta, K. S. Havner, Y. Horie, N. P. Khosla, H. R. Malcom Jr., W. J. Rasdorf, N. M. Roupail, C. C. Tung; *Adjunct Professor:* R. C. Heath; *Professors*

Emeriti: M. Amein, P. D. Cribbins, R. A. Douglas, J. F. Ely, R. E. Fadum, C. L. Heimbach, J. W. Horn, A. I. Kashef, C. L. Mann, P. H. McDonald Jr., S. W. Nunnally, H. E. Wahls, P. Z. Zia; ***Associate Professors:*** M. A. Barlaz, J. W. Baugh Jr., L. E. Bernokl, W. L. Bingham, A. C. Chao, J. E. Hummer, Y. R. Kim, P. C. Lambe, V. C. Matzen, J. M. Nau, M. F. Overton, M. S. Rahman, J. R. Stone; ***Associate Professors Emeriti:*** E. D. Gurley, J. C. Smith; ***Assistant Professors:*** H. C. Frey, T. Hassan, D. R. Knappe, N. Krstulovic, M. L. Leming, S. K. Liehr, S. R. Ranjithan, A. A. Tayebali; ***Visiting Assistant Professor:*** A. Gupta; ***Adjunct Assistant Professor:*** D. R. van der Vaart

ASSOCIATE MEMBER OF THE PROGRAM

Associate Professor : B. Kasal

INTERINSTITUTIONAL ADJUNCT GRADUATE FACULTY

S. Chang, L. E. King, M. R. Salami, J. S. Wu

Graduate programs are offered in coastal and ocean engineering, computer-aided engineering, construction engineering and management, environmental and water resources engineering, geotechnical engineering, structures and mechanics, transportation engineering and materials.

Admission Requirements: Provisional admission may be granted to applicants who do not satisfy normal admission criteria but have other special qualifications. Applicants without academic experience in civil engineering may be required to take undergraduate courses to remove deficiencies, without graduate credit. The Graduate Record Examination normally is required of all applicants.

Master's Degree Requirements: (M.CE.): The M.CE. is an Option B non-thesis degree with other requirements, such as independent projects or core courses, specified in some areas of specialization. At least two-thirds of a master's program should be in a well-defined major area of concentration. A formal minor is not permitted. ***(M.S.):*** A thesis is required and a formal minor is optional.

Doctoral Degree Requirements: The Ph.D. typically requires one year of full-time course work beyond the master's degree. The program must develop a well-defined major area of concentration and may include supporting courses outside the major or a formal minor in a related field.

Student Financial Support: Departmental teaching and research assistantships are available including coverage of tuition. Full and partial fellowships, which may include tuition and fees, are available for exceptional U. S. applicants. All financial

aid recipients are selected on merit-based competition with other applicants. Applications requesting financial aid should be received by March 1 for Fall admission and by September 1 for Spring admission.

GRADUATE COURSES

- CE 501 Transportation Systems Engineering.**
- CE 502 Traffic Operations.**
- CE 503 Highway Design.**
- CE 504 Airport Planning and Design.**
- CE 505 Advanced Airport Systems Design.**
- CE 521 Structural Models.**
- CE 522 Theory and Design of Prestressed Concrete.**
- CE 523 Theory and Behavior of Steel Structures.**
- CE 524 Analysis and Design of Masonry Structures.**
- CE 537 Computer Methods and Applications.**
- CE 538 Information Technology and Modeling.**
- CE 548 Engineering Properties of Soils I.**
- CE 549 Soil and Site Improvement.**
- CE 561 Construction Planning and Scheduling.**
- CE 564 Legal Aspects of Contracting.**
- CE 571 Theory of Water and Waste Treatment.**
- CE 572 Design of Water and Wastewater Facilities.**
- CE 574 Chemistry and Microbiology for Engineers I.**
- CE 576 Engineering Principles of Air Pollution Control.**
- CE 577 Engineering Principles of Solid Waste Management.**
- CE 580 Flow in Open Channels.**
- CE 583 Engineering Aspects of Coastal Processes.**
- CE 584 Hydraulics of Ground Water.**
- CE 586 Engineering Hydrology.**
- CE 590 Special Topics in Civil Engineering.**
- CE 591 Special Topics in Civil Engineering Computing.**
- CE 592 Special Topics in Construction Engineering.**
- CE 593 Special Topics in Geotechnical Engineering.**
- CE 594 Special Topics in Structural Mechanics.**
- CE 595 Special Topics in Transportation Engineering.**
- CE 596 Special Topics in Water Resources and Environmental Engineering.**
- CE 601 Civil Engineering Seminar.**
- CE 602 Seminar in Civil Engineering Computing.**
- CE 603 Seminar in Construction Engineering.**
- CE 604 Seminar in Geotechnical Engineering.**
- CE 605 Seminar in Structural Mechanics.**
- CE 606 Seminar in Transportation Engineering.**

CE 607 Seminar in Water Resources and Environmental Engineering.
CE 635 Advanced Reading in Civil Engineering.
CE 675 Civil Engineering Projects.
CE 685 Master's Supervised Teaching.
CE 693 Master's Supervised Research.
CE 695 Master's Thesis Research.
CE 699 Master's Thesis Preparation.
CE 701 Urban Transportation Planning.
CE 713 Theory of Elasticity I.
CE 714 Stress Waves.
CE 715 Advanced Strength of Materials.
CE 716 Elastic Stability.
CE 717 Theory of Plates and Shells.
CE 718 Plasticity and Limit Analysis.
CE 719 Finite Deformation of Materials I.
CE 720 Matrix and Finite Element Structural Analysis I.
CE 721 Matrix and Finite Element Structural Analysis.
CE 722 Structural Dynamics.
CE 723 Advanced Structural Dynamics.
CE 724 Probabilistic Methods of Structural Engineering.
CE 725 Earthquake Structural Engineering.
CE 726 Advanced Theory of Concrete Structures.
CE 727 Advanced Structural Design I.
CE 728 Advanced Structural Design II.
CE 737 Computer-aided Engineering Systems.
CE 741 Advanced Soil Mechanics.
CE 742 Advanced Soil Mechanics.
CE 744 Foundation Engineering.
CE 746 Dynamics of Soils and Foundations.
CE 751 Theory of Concrete Mixtures.
CE 753 Asphalt and Bituminous Materials.
CE 755 Highway Pavement Design.
CE 757 Pavement Management Systems.
CE 759 Inelastic Behavior of Construction Materials.
CE 761 Design of Temporary Structures.
CE 762 Construction Productivity.
CE 763 Materials Management in Construction.
CE 765 Construction Equipment Systems.
CE 766 Building Construction Systems.
CE 769 Automation and Robotics in Civil Engineering.
CE 771 Advanced Water and Waste Treatment: Principles and Design.
CE 773 Hazardous Waste Management and Treatment.
CE 774 Chemistry and Microbiology for Engineers II.

CE 775 Modeling and Analysis of Environmental Systems.
 CE 776 Advanced Water Management Systems.
 CE 781 Behavior and Analysis of Ocean Structures.
 CE 782 Coastal Hydrodynamics.
 CE 783 Design of Coastal Facilities.
 CE 784 Ground Water Contaminant Transport.
 CE 785 Urban Stormwater Management.
 CE 790 Advanced Topics in Civil Engineering.
 CE 791 Advanced Topics in Civil Engineering Computing.
 CE 792 Advanced Topics in Construction Engineering.
 CE 793 Advanced Topics in Geotechnical Engineering.
 CE 794 Advanced Topics in Structural Mechanics.
 CE 795 Advanced Topics in Transportation Engineering.
 CE 796 Advanced Topics in Water Resources and Environmental Engineering.
 CE 801 Civil Engineering Seminar.
 CE 802 Seminar in Civil Engineering Computing.
 CE 803 Seminar in Construction Engineering.
 CE 804 Seminar in Geotechnical Engineering.
 CE 805 Seminar in Structural Mechanics.
 CE 806 Seminar in Transportation Engineering.
 CE 807 Seminar in Water Resources and Environmental Engineering.
 CE 839 Advanced Reading in Civil Engineering.
 CE 885 Doctoral Supervised Teaching.
 CE 890 Doctoral Preliminary Examination.
 CE 893 Doctoral Supervised Research.
 CE 895 Doctoral Dissertation Research.
 CE 899 Doctoral Dissertation Preparation.

Comparative Biomedical Sciences

Degrees Offered: Ph.D., M.S.

GRADUATE FACULTY

Professor J. H. Britt, Coordinator

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Burroughs Wellcome Distinguished Professor: J. E. Riviere

Professors: K. B. Adler, G. W. Almond, K. L. Anderson, R. A. Argenzio, A. L. Aronson, C. E. Atkins, H. J. Barnes, E. B. Breitschwerdt, T. T. Brown Jr., C. F. Brownie, S. E. Bunch, P. B. Carter, J. M. Cullen, M. G. Davidson, E. V. De Buysscher, D. J. DeYoung, L. N. Fleisher, O. J. Fletcher Jr., R. B. Ford, F. J.

Fuller, C. B. Grindem, J. S. Guy, T. E. Hamm Jr., B. Hammerberg, E. M. Hardie, M. G. Levy, D. H. Ley, D. J. Meuten, N. A. Monteiro-Riviere, E. J. Noga, N. C. Olson, P. E. Orndorff, W. D. Oxender, R. L. Page, L. E. Perryman, M. C. Roberts, P. L. Sannes, J. E. Smallwood, E. A. Stone, M. K. Stoskopf, L. P. Tate Jr., C. Teng, D. E. Thrall, M. B. Tompkins, W. A. F. Tompkins; *Research Professor*: M. C. McGahan; *Visiting Professor*: E. A. Havell; *Adjunct Professors*: G. R. Burleson, R. L. Cooper, S. W. Crane, M. W. Dewhirst, K. L. Dreher, J. Fine, J. N. MacCormack, R. R. Maronpot, P. Nettesheim, D. C. Richardson, F. Welsch; *Professors Emeriti*: W. M. Adams, E. G. Batte, P. J. Bentley, H. A. Berkhoff, L. Coggins, T. M. Curtin, R. C. Dillman, D. M. Hanson, D. R. Howard, J. K. Magor, D. J. Moncol, J. E. Newbold, C. E. Stevens; *Associate Professors*: S. A. Bai, C. R. Berry, H. M. Berschneider, K. F. Bowman, B. A. Breuhaus, D. G. Bristol, P. Cowen, W. M. Duckett, K. Flammer, J. E. Gadsby, B. Gilger, E. C. Hawkins, L. C. Hudson, E. Hunt, B. W. Keene, J. F. Levine, N. E. Love, M. B. McCaw, R. E. Meyer, M. G. Papich, B. P. Peters, G. S. Price, C. L. Robinette, S. C. Roe, N. J. H. Sharp, B. Sherry, B. D. Slenning, I. W. Smoak, K. A. Spaulding, C. R. Swanson, S. L. Tonkonogy, S. L. Vaden, J. Vaillancourt, S. D. Van Camp, D. P. Wages, B. J. Weigler, M. D. Whitacre; *Research Associate Professor*: J. M. Horowitz; *Visiting Research Associate Professor*: S. Kennedy-Stoskopf; *Adjunct Associate Professors*: G. A. Boorman, B. E. Butterworth, R. C. Cattley, D. Dixon, T. E. Eling, J. Everitt, T. L. Goldsworthy, J. J. Heindel, J. M. Hinshaw, M. R. Loomis, P. C. Mann, E. E. McConnell, K. T. Morgan, R. L. Peiffer Jr., J. A. Raleigh; *Assistant Professors*: C. Altier, P. Arasu, M. T. Correa, P. R. Davies, G. A. Dean, J. Deen, P. W. Farin, W. A. Horne, H. A. Jackson, J. M. Law, D. E. Malarkey, D. J. Marcellin, K. G. Mathews, R. T. Miller, K. R. Munana, T. Olivry, G. M. Rogers, S. L. Vivrette; *Research Assistant Professors*: J. B. Allen, G. Qiao; *Clinical Assistant Professor*: W. R. Redding; *Visiting Assistant Professors*: R. V. English, B. D. Hansen; *Adjunct Assistant Professors*: B. J. Davis, D. C. Dorman, D. M. Prescott, S. H. Randell, M. E. Stebbins; *Electron Microscopy Director*: M. J. Dykstra.

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: C. F. Abrams Jr., W. J. Croom Jr., M. A. Qureshi; *Associate Professors*: J. M. Hinshaw, S. M. Laster, W. E. M. Morrow

Course offerings and research topics currently include, but are not limited to: immunology, cardiology, pharmacokinetics, oncology, toxicology, gastroenterology, neurophysiology, reproductive physiology, biotechnology, microbiology, aquatic/wildlife biology, biomedical engineering, endocrinology, molecular biology, pulmonary biology, epidemiology, population medicine, health systems monitoring, transplantation and radiology.

Admission Requirements: All applications are reviewed by the Graduate Student Admissions Committee of the College, composed of faculty members representing each area of the graduate program. Scores from the GRE are required for admission by all applicants. Candidates who do not have a DVM degree must have a baccalaureate degree or advanced degree from a college or university recognized as standard by a regional or general accrediting agency. Students with a 3.0 (on a 4.0 scale) undergraduate or DVM curriculum with appropriate course background will be considered for admission.

Doctoral Degree Requirements: Credit hour requirements for the Ph.D. degree are determined by the graduate student's committee with approval of the Director of Graduate Programs and the Graduate School.

Student Financial Support: Research assistantships are awarded to qualified candidates on the competitive basis by the College. These are for 12-month periods, and stipends are competitive with those of other programs. These positions are funded by the grants of individual faculty members and the state appropriations to the College and departments.

Other Relevant Information: The program is organized across traditional departmental lines as areas of concentration which include: cell biology/morphology, epidemiology/ population medicine, microbiology, pathology and pharmacology. These provide extensive interdisciplinary training and maintain a highly effective liaison with graduate programs in other schools of the university, as well as those of nearby Duke University and the University of North Carolina at Chapel Hill.

GRADUATE COURSES

CBS(BAE) 522 Mechanics of Biological Materials.

CBS(ANS,PHY,ZO) 602 Seminar in Biology of Reproduction.

CBS 610 Special Topics.

CBS 685 Master's Supervised Teaching.

CBS 690 Master's Examination.

CBS 693 Master's Supervised Research.

CBS 695 Master's Thesis Research.

CBS 699 Master's Thesis Preparation.

CBS 730 Veterinary Histology.

CBS 731 Applied Veterinary Anatomy I.

CBS 732 Electron Microscopy in Veterinary Medicine.

CBS 740 Research Animal Care and Use.

CBS 742 Advanced Systemic Histopathology.

CBS 743 Toxicologic Pathology I.

CBS 750 Veterinary Medical Virology I.

CBS 751 Pathogenic Bacteriology and Mycology.
 CBS 752 Diagnostic Bacteriology and Mycology.
 CBS 753 Veterinary Immunology.
 CBS 754 Principles of Epidemiology.
 CBS(IMM) 755 Immunoparasitology.
 CBS(IMM,MB,PHY,PO) 756 Immunogenetics.
 CBS 762 Systemic Pharmacology and Toxicology.
 CBS(ANS,NTR,PHY) 764 Comparative Physiology of the Digestive System.
 CBS 770 Cell Biology.
 CBS 771 Veterinary Medical Virology II.
 CBS 773 Advanced Developmental Biology.
 CBS 774 Epidemiology of Infectious Diseases of International Importance.
 CBS 780 Veterinary Production Epidemiology.
 CBS 782 Marine Mammal Medicine.
 CBS(MB) 783 Advanced Immunology.
 CBS 785 Advanced Pharmacology.
 CBS 787 Pharmacokinetics.
 CBS 790 Special Topics in Clinical Pathology.
 CBS(ANS,PHY,ZO) 802 Seminar in Biology of Reproduction.
 CBS 803 Seminar in Surgical Pathology.
 CBS 804 Seminar in Necropsy Pathology.
 CBS 805 Seminar in Pharmacology.
 CBS 806 Seminar in Cell Biology.
 CBS(IMM) 807 Seminar in Veterinary Microbiology/ Immunology.
 CBS 810 Special Topics.
 CBS 812 Special Topics in Pathology.
 CBS 813 Special Topics in Laboratory Pharmacology.
 CBS(IMM) 816 Advanced Topics in Immunology and Biotechnology.
 CBS 817 Advanced Topics in Zoological Medicine I.
 CBS 818 Advanced Topics in Zoological Medicine II.
 CBS 860 Instrumentation in Pharmacological Research.
 CBS 861 Bacterial Pathogenic Mechanisms.
 CBS 862 Professional Conduct in Biomedical Research.
 CBS 885 Doctoral Supervised Teaching.
 CBS 890 Doctoral Preliminary Examination.
 CBS 893 Doctoral Supervised Research.
 CBS 895 Doctoral Dissertation Research.
 CBS 899 Doctoral Dissertation Preparation.

Computer Engineering

For a listing of graduate faculty and program information, see electrical and computer engineering.

Computer Science

Degrees Offered: Ph.D., M.S., Master of Computer Science

GRADUATE FACULTY

Professor A. L. Tharp, *Head of the Department*

Associate Professor R. A. Dwyer, *Director of Graduate Programs*

Box 8206, (919) 515-2654, graduate@csc.ncsu.edu

Distinguished University Research Professor: D. L. Bitzer

Professors: W. Chou, E. W. Davis Jr., R. J. Fornaro, R. E. Funderlic, D. F. McAllister, H. G. Perros, W. E. Robbins, C. D. Savage, W. J. Stewart, K. Tai, M. A. V. Vouk; *Adjunct Professor:* R. J. Plemmons; *Professor Emeritus:* D. C. Martin; *Associate Professors:* D. R. Bahler, W. R. Cleaveland II, E. F. Gehringer, T. L. Honeycutt, S. P. Iyer, D. S. Reeves, R. D. Rodman, M. F. M. Stallmann, ; *Adjunct Associate Professor:* K. D. Clark; *Assistant Professors:* V. E. Jones, J. C. Lester, J. G. Rossie Jr., M. P. Singh, R. A. St. Amant, S. F. Wu; *Visiting Assistant Professors:* I. Rhee, G. N. Rouskas; *Adjunct Assistant Professors:* M. Aparicio IV, G. L. Craig, G. Q. Kenney, J. Mauney, M. Singh, S. K. Singhal, K. J. Ulberg, A. O. Zaghoul; *Assistant Professors Emeriti:* J. W. Hanson, N. F. Williamson

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: D. P. Agrawal, C. D. Meyer Jr., A. A. J. Nilsson, W. E. Snyder; *Associate Professors:* J. W. Baugh Jr., I. Viniotis

The department awarded its first graduate degrees in 1990 and has quickly assumed a respectable place among Ph.D.-granting computer science departments. The faculty has broad-ranging interests in software systems, computer communications and performance analysis, computer architecture, and combinatorial and numerical algorithms.

Admission Requirements: Successful applicants have an accredited baccalaureate degree with a B average, including computer science course work at least equivalent to a minor. Applicants must submit scores for the GRE General Tests and GRE Computer Science Subject Test. [Exception: Applicants for the Master of Computer Science curriculum who do not desire financial aid may omit the Subject Test.] The department does not currently admit students on a provisional basis.

Master's Degree Requirements: The M.S. requires two core courses and thesis research (typically six credits). The advisory committee may waive the thesis requirement for students who pass the Ph.D. qualifying exams and complete specified course work in lieu of research. The Master of Computer Science is a terminal professional degree granted upon successful completion of 30 hours of course work, including three courses from the core list: CSC 501, CSC 505, CSC 506 and CSC 707.

Doctoral Degree Requirements: Ph.D. students normally complete 60 semester hours of post-baccalaureate course work. They must also complete written qualifying examinations in three broad areas (theoretical foundations, software systems and architecture), individualized in-depth written and oral preliminary examinations, and a public defense of a dissertation describing substantial original, independent scholarly work.

Student Financial Support: A unique asset is the department's Industrial Assistantship Program, under which graduate students perform part-time work at local firms. During 1995-96, this program supported five students, while 55 more held traditional teaching and research assistantships. Outstanding candidates may receive fellowships or be employed at lecturers.

Other Relevant Information: Graduates at all levels are highly respected and well paid locally and elsewhere. Many M.S. and M.CSC graduates begin or continue careers performing and supervising advanced software development in and around the Research Triangle Park. Most recent Ph.D.s assumed positions of technical leadership in well-known large companies. Despite a competitive academic market, two assumed tenure-track faculty positions and two others declined such offers; two more pursued post-doctoral research.

GRADUATE COURSES

CSC(ECE) 501 Operating Systems Principles.

CSC(ECE) 505 Design and Analysis of Algorithms.

CSC(ECE) 506 Architecture of Parallel Computers.

CSC(ECE) 510 Software Engineering.

CSC 512 Compiler Construction.

CSC(ECE) 517 Object-oriented Languages and Systems

CSC 520 Artificial Intelligence I.

CSC 523 Computational Linguistics.

CSC 541 Advanced Data Structures.

CSC(IE) 546 Management Decision and Control Systems.

CSC 550 Computer Graphics.

CSC 554 Human-Computer Interaction.

CSC(IE) 556 Voice Input/Output Communication Systems.
CSC 557 Multimedia Technology.
CSC(MA,OR) 565 Graph Theory.
CSC(ECE) 570 Computer Networks.
CSC(ECE) 572 Introduction to Computer Communications.
CSC(ECE) 576 Telecommunications Systems Engineering.
CSC(ECE) 579 Introduction to Computer Performance Modeling.
CSC(MA) 580 Numerical Analysis I.
CSC 591 Special Topics in Computer Science.
CSC 630 Individual Study in Computer Science.
CSC 685 Master's Supervised Teaching.
CSC 690 Master's Examination.
CSC 693 Master's Supervised Research.
CSC 695 Master's Thesis Research.
CSC 699 Master's Thesis Preparation.
CSC 707 Automata, Languages and Computability Theory.
CSC 714 Real Time Computer Systems.
CSC 715 Concurrent Software Systems.
CSC 720 Artificial Intelligence II.
CSC 723 Computational Semantics.
CSC 742 Database Management Systems.
CSC(ECE) 748 Parallel Processing.
CSC(IE) 756 Advances in Voice Input/output Communications Systems.
CSC(OR,IE) 762 Computer Simulation Techniques.
CSC(ECE) 776 Performance Evaluation of Computer Networks.
CSC(ECE) 777 Telecommunications Network Design.
CSC(ECE) 779 Advanced Computer Performance Modeling.
CSC(MA) 780 Numerical Analysis II.
CSC(MA) 783 Parallel Algorithms and Scientific Computation.
CSC 791 Advanced Topics in Computer Science.
CSC 830 Advanced Individual Study in Computer Science.
CSC 885 Doctoral Supervised Teaching.
CSC 890 Doctoral Preliminary Examination.
CSC 893 Doctoral Supervised Research.
CSC 895 Doctoral Dissertation Research.
CSC 899 Doctoral Dissertation Preparation.

Counselor Education

Degrees Offered: Ph.D., M.S., M.Ed.

GRADUATE FACULTY

Professor S. B. Baker, *Head of the Department*

Box 7801, (919) 515-2244, sbaker@poe.coe.ncsu.edu

Professors: J. A. Anderson, E. R. Gerler Jr., L. K. Jones, D. C. Locke; ***Professor Emeritus:*** N. A. Sprinthall; ***Associate Professors:*** H. A. Exum, T. L. Robinson; ***Visiting Associate Professor:*** T. H. Stafford Jr.; ***Associate Professor Emeritus:*** J. G. McVay; ***Assistant Professor:*** S.-M. R. Ting; ***Visiting Assistant Professors:*** K. J. Brake, J. S. Hall, B. C. Sweeney; ***Adjunct Assistant Professor:*** D. D. Saidla

Admission Requirements: Requirements include a 3.00 average (4.00 scale) in the junior and senior years of the undergraduate program and one year of work experience in a human services capacity. The best-qualified applicants will be accepted up to the number of spaces that are available for new students. Exceptions to the minimum grade-point average and work experience requirements may be made for students with special backgrounds, abilities and interests.

Admission requirements for the Ph.D. program include, in addition to the general admission requirements, a 48-semester-hour master's degree, the completion of a work sample and a personal interview.

Master's Degree Requirements: A minimum of 48 semester hours are required in all master's degree tracks.

Doctoral Degree Requirements: Approximately 66 semester hours of required course work in the Ph.D. program in counselor education includes courses in research, behavioral sciences foundation, counselor education theory and professional application.

Other Relevant Information: The Council for Accreditation of Counseling and Related Educational Programs (CACREP), a specialized accrediting body recognized by the Council on Post-secondary Accreditation (COPA), has conferred accreditation to the following program areas in the Department of Counselor Education: student development in higher education (M.S., M.Ed.) and the Ph.D. program in counselor education. These program area have admission and curriculum requirements that conform to CACREP standards. The school counseling and community/agency tracks (M.S., M.Ed.) are CACREP-like in preparation for being accredited by CACREP.

GRADUATE COURSES

- ECD 510 Introduction to Counseling.**
- ECD 524 Career Counseling and Development.**
- ECD 525 Cross Cultural Counseling.**
- ECD 530 Theories and Techniques of Counseling.**
- ECD 533 Guidance and Counseling in the Secondary Schools.**
- ECD 534 Guidance and Counseling in Elementary and Middle Schools.**
- ECD 535 Student Development in Higher Education.**
- ECD 536 Community Service Agencies.**
- ECD 539 Group Counseling.**
- ECD 540 Gender Issues in Counseling.**
- ECD 543 The American College Student.**
- ECD 560 Research and Assessment in Counseling.**
- ECD 590 Special Problems.**
- ECD 620 Special Problems in Guidance.**
- ECD 640 Prepracticum in Counseling.**
- ECD 641 Introductory Practicum in Counseling.**
- ECD 642 Practicum in Counseling.**
- ECD 651 Internship in School Counseling.**
- ECD 652 Internship in College Student Development.**
- ECD 653 Internship in Agency Counseling.**
- ECD 666 Observation and Supervised Field Work.**
- ECD 692 Master's Research Project.**
- ECD 693 Master's Supervised Research.**
- ECD 695 Master's Thesis Research.**
- ECD 699 Master's Thesis Preparation.**
- ECD 731 Career Development Theory and Research.**
- ECD 733 Cognitive-behavioral Theory, Research and Practice.**
- ECD 735 Counseling Supervision: Theory and Research.**
- ECD 737 Cognitive-developmental Theory, Research and Practice.**
- ECD 738 Research in Counselor Education.**
- ECD 790 Special Problems.**
- ECD 820 Special Problems.**
- ECD 843 Advanced Counseling Practicum.**
- ECD 847 Counseling Supervision: Practicum.**
- ECD 850 Internship in Counselor Education.**
- ECD 860 Professional Issues in Counseling.**
- ECD 885 Doctoral Supervised Teaching.**
- ECD 886 Supervised Practice Teaching in Counselor Education.**
- ECD 890 Doctoral Preliminary Examination.**
- ECD 892 Doctoral Research Project.**

ECD 893 Doctoral Supervised Research.
ECD 895 Doctoral Dissertation Research.
ECD 899 Doctoral Dissertation Preparation.

Crop Science

Degrees Conferred: Ph.D, M.S., Master of Crop Science

GRADUATE FACULTY

Professor D. A. Knauft, Head of the Department

Professor R. C. Rufty, Director of Graduate Programs

Box 7620, (919) 515-3667, becky_rufty@ncsu.edu

Distinguished University Professor and William Neal Reynolds Professor: M. M. Goodman

Philip Morris Professor: G. F. Peedin

William Neal Reynolds Professor: E. A. Wernsman

Professors: D. T. Bowman, A. H. Bruneau, B. E. Caldwell, H. D. Coble, R. J. Cooper, F. T. Corbin, E. J. Dunphy, E. L. Fiscus, J. T. Green Jr., T. G. Isleib, R. E. Jarrett, H. M. Linker, R. C. Long, J. P. Mueller, J. P. Murphy, R. P. Patterson, C. H. Peacock, T. W. Rufty Jr., W. D. Smith, H. T. Stalker Jr., J. B. Weber, W. W. Weeks, G. G. Wilkerson, J. C. Wynne, A. C. York; Professors (USDA): J. C. Burns, J. W. Burton, T. E. Carter Jr., S. C. Huber, J. E. Miller, R. F. Wilson; Adjunct Professor: K. D. Getsinger; Professors Emeriti: C. T. Blake, C. A. Brim, D. S. Chamblee, J. F. Chaplin, W. K. Collins, W. A. Cope, D. A. Emery, W. T. Fike Jr., D. U. Gerstel, W. C. Gregory, H. D. Gross, G. R. Gwynn, P. H. Harvey, G. L. Jones, J. A. Lee, W. M. Lewis, R. P. Moore; Associate Professors: D. C. Bowman, D. A. Danehower, R. E. Dewey, K. Edmisten, G. P. Fenner, S. H. Kay, R. D. Keys, V. A. Sisson, J. F. Spears, A. K. Weissinger, R. Wells, J. W. Wilcut, F. H. Yelverton; Associate Professors (USDA): K. O. Burkey, P. Kwanyuen, D. P. Livingston III; Assistant Professors: L. R. Gibson, R. W. Heiniger, D. L. Jordan, J.-M. Luginbuhl, R. Qu, P. R. Weisz; Visiting Assistant Professor: L. A. Urban; Adjunct Assistant Professor: M. L. Fraser

ASSOCIATE MEMBER OF THE PROGRAM

Professor: W. F. Thompson

Areas of specialization include plant breeding, crop production and physiology, forage crops ecology, turfgrass science, weed science, agro-ecology and plant chemistry.

Excellent facilities for graduate training are available. Many special facilities such as preparation rooms for plant and soil samples, cold storage facilities for plant material, greenhouse space, growth control chambers, computer local area network, and access to the plant environment laboratory (Phytotron) are provided if required.

Research farms located throughout North Carolina include a variety of soil and climatic conditions needed for experiments in plant breeding, crop management, forage ecology, turfgrass management and physiology, and weed control.

Strong supporting departments increase opportunities for broad and thorough training. Graduate students in crop science work cooperatively with or obtain instruction in the Departments of Biochemistry, Botany, Chemistry, Computer Science, Entomology, Horticultural Science, Genetics, Mathematics, Microbiology, Plant Pathology, Soil Science and Statistics.

Admissions Requirements: To be admitted, a student should be a graduate of an accredited major in agronomy, biology, crop science, genetics, horticulture, plant science or related field of study. Graduates of other programs may be admitted but will be required to make up certain undergraduate deficiencies without graduate credit. Acceptance of applicants is competitive and limited by program space for new students. Exceptions to the 3.0 GPA may be made for students with special backgrounds, abilities or interests.

Master's Degree Requirements: One hour of Crop Science Seminar (CS 601) and a minimum of 6 credit hours at the 600 level is required for M.S. candidates. A minimum of 4 hours of special problems (CS 620) is required for the Master of Crop Science degree. An exit seminar presentation to the department is required.

Doctoral Degree Requirements: Course requirements for students are determined through the graduate advisory committee process. Core courses have been identified for students studying physiology, management, production, weed science and plant growth regulation. An exit seminar presentation to the department is required.

Student Financial Support: Graduate assistantships and fellowships can be awarded to qualified applicants depending on funding availability and program space. Nonresident tuition may be waived for students granted assistantships.

Other Relevant Information: A thesis (M.S. and Ph.D.) or special problems (Master of Crop Science) outline and graduate plan of work should be submitted to

the Director of Graduate Programs by the end of the first regular (spring or fall) semester.

GRADUATE COURSES

CS(HS,PP) 502 Plant Disease: Methods and Diagnosis.
CS 601 Seminar.
CS 620 Special Problems.
CS 685 Master's Supervised Teaching.
CS 690 Master's Examination.
CS 693 Master's Supervised Research.
CS 695 Master's Thesis Research.
CS 699 Master's Thesis Preparation.
CS 711 Tobacco Technology.
CS 713 Physiological Aspects of Crop Production.
CS(HS) 715 Weed Science Research Techniques.
CS(HS) 716 Weed Biology.
CS(HS) 717 Weed Management Systems.
CS(HS) 718 Biological Control of Weeds.
CS(GN) 719 Origin and Evolution of Cultivated Plants.
CS(GN,HS) 720 Molecular Biology in Plant Breeding.
CS(HS,SSC,TOX) 725 Pesticide Chemistry.
CS(HS,SSC,TOX) 727 Pesticide Behavior and Fate in the Environment.
CS(HS) 729 Herbicide Behavior in Plants.
CS(NG,HS) 741 Plant Breeding Methods.
CS(GN,HS) 745 Quantitative Genetics in Plant Breeding.
CS(GN,HS) 746 Breeding Methods.
CS(GN,HS,PP) 748 Breeding for Pest Resistance.
CS(FOR,SSC) 777 Conservation and Sustainable Development I.
CS 801 Seminar.
CS 820 Special Problems.
CS(GN,HS) 860 Plant Breeding Laboratory.
CS(GN,HS) 861 Plant Breeding Laboratory.
CS 885 Doctoral Supervised Teaching.
CS 890 Doctoral Preliminary Examination.
CS 893 Doctoral Supervised Research.
CS 895 Doctoral Dissertation Research.
CS 899 Doctoral Dissertation Preparation.

Curriculum and Instruction

Degrees Offered: Ph.D., M.S., M.Ed.

GRADUATE FACULTY

Professor C. L. Crossland, Head of the Department

Professor B. J. Fox, Director of Graduate Programs

Box 7801, (919) 515-3221, fox@poe.coe.ncsu.edu

Professors: D. A. Cullinan, P. H. Martorella, B. R. Poulton; *Adjunct Professors:* D. D. Copeland, R. A. Edelfelt.; *Professor Emeritus:* B. M. Parramore; *Associate Professors:* P. L. Marshall, T. P. O'Brien, S. S. Osborne, C. A. Pope, R. J. Pritchard, E. J. Sabornie, H. A. Spires, E. S. Vasu; *Adjunct Associate Professor:* H. A. Fingeret; *Associate Professors Emeriti:* J. F. Arnold, M. B. Richards, L. Thies-Sprinthall; *Assistant Professors:* M. L. Alibrandi, C. M. Beal, A. J. Reiman, A. V. Wilson; *Visiting Assistant Professor:* M. Terhaar-Yonkers; *Adjunct Assistant Professor:* S. B. Buckner

Admission Requirements: A 500-800 word statement describing professional goals. Some areas of study require that applicants be qualified to hold a baccalaureate-level teaching certificate or have teaching experience. GRE scores not more than five years old for the doctoral program, except when scores older than five years are associated with a master's degree completed within five years of the doctoral application.

Master's Degree Requirements: A minimum of 36 course credit hours and a written examination are required. The Master of Science degree requires a final oral examination and thesis approved by the graduate committee.

Doctoral Degree Requirements: A minimum of 72 course credit hours which includes 15-18 hours of research and a curriculum specialty and 12 hours of dissertation credit.

Student Financial Support: No financial aid is available on a regular basis.

Other Relevant Information: The department offers master's degrees in curriculum and instruction with areas of concentration in elementary education, English education, reading, instructional technology - computers, marketing education, social studies and supervision. Master's degrees in special education are offered in the areas of behavior disorders, learning disabilities and mental retardation. A master's degree in middle grades education includes a dual concentration in language arts and social studies.

GRADUATE COURSES

- ECI 500 Theory and Practice in Teaching Diverse Populations.
- ECI 570 Learning Disabilities.
- ECI 571 Methods and Materials in Learning Disabilities.
- ECI 572 Resource Teaching in Special Education.
- ECI 573 Classroom Management in Special Education.
- ECI 601 Seminar.
- ECI 602 Seminar in Curriculum and Instruction.
- ECI 603 Advanced Seminar in Reading.
- ECI 620 Special Problems.
- ECI 630 Independent Study in Curriculum and Instruction.
- ECI 640 Practicum in Curriculum and Instruction.
- ECI 641 Practicum in Mentoring of Teachers.
- ECI 642 Practicum in Instructional Technology - Computers.
- ECI 643 Practicum in Social Studies.
- ECI 644 Practicum in Elementary Education.
- ECI 645 Diagnostic-prescriptive Practicum in Reading.
- ECI 646 Practicum in Middle Grades Education.
- ECI 647 Practicum in Marketing Education.
- ECI 648 Practicum in Special Education.
- ECI 650 Internship in Curriculum and Instruction.
- ECI 651 Internship in Mentoring.
- ECI 652 Internship in Instructional Technology - Computers.
- ECI 653 Internship in Social Studies.
- ECI 654 Internship in Elementary Education.
- ECI 655 Internship in Reading Education.
- ECI 656 Internship in Middle Grades Education.
- ECI 657 Internship in Marketing Education.
- ECI 658 Internship in Special Education.
- ECI 680 Directed Research in Curriculum and Instruction.
- ECI 685 Master's Supervised Teaching.
- ECI 690 Master's Examination.
- ECI 691 Research Applications in Curriculum and Instruction.
- ECI 692 Master's Research Projects.
- ECI 693 Master's Supervised Research.
- ECI 695 Master's Thesis Research.
- ECI 699 Master's Thesis Preparation.
- ECI 700 The School Curriculum.
- ECI 701 Curriculum Theory and Development.
- ECI 702 Teaching through the Arts.
- ECI 703 Effective Teaching.
- ECI 704 Principles and Practices of Supervision.

- ECI 705 Instructional Supervision of Teachers.
- ECI 709 Special Problems in Curriculum and Instruction.
- ECI 714 Computer Applications in Instruction.
- ECI 715 Development of Microcomputer Software for Instruction.
- ECI 716 Design and Evaluation of Instructional Materials.
- ECI 719 Special Problems in Instructional Technology.
- ECI 720 The Teaching of Composition.
- ECI 721 Teaching Literature for Young Adults.
- ECI 725 Contemporary Approaches in the Teaching of Social Studies.
- ECI 726 Theory and Research on Teaching and Learning Social Studies.
- ECI 727 Special Problems in Social Studies Education.
- ECI 729 Special Problems in English Education.
- ECI 730 Social Studies in the Elementary School.
- ECI 731 Teachers and the Elementary School Curriculum.
- ECI 732 Early Childhood Education.
- ECI 733 Language Arts in the Elementary School.
- ECI 739 Special Problems in Elementary Education.
- ECI 740 Reading in the Elementary School.
- ECI 741 Reading in the Content Areas.
- ECI 742 Literacy Instruction for College Students: Research, Theory and Practice.
- ECI 743 Diagnosis of Reading Disabilities.
- ECI 744 Remediation of Reading Disabilities.
- ECI 745 Theory and Process in Reading and Language Arts.
- ECI 749 Special Problems in Reading Education.
- ECI 750 Foundations of Middle Years Education.
- ECI 751 Teaching/Learning Approaches for Emerging Adolescents.
- ECI 759 Special Problems in Middle Years Education.
- ECI 760 Professional Development in Marketing Education.
- ECI 761 Curriculum and Instruction in Marketing Education.
- ECI 762 Marketing Education Program Management.
- ECI 769 Special Problems in Marketing Education.
- ECI 770 Education of Exceptional Children.
- ECI 771 Educational Diagnosis and Prescription for Children with Exceptionalities.
- ECI 772 Introduction to the Gifted Individual.
- ECI 773 Behavior Disorders.
- ECI 774 Mental Retardation.
- ECI 775 Communication Disorders in the Classroom.
- ECI 776 Methods and Materials - Teaching Retarded Children.
- ECI 777 Education of Severely Handicapped.
- ECI 778 Methods for Teaching the Gifted.
- ECI 779 Methods and Materials: Behavior Disorders.

ECI 780 Transition Program for Students with Mild Disabilities.
 ECI 786 Introduction to Issues and Techniques in Visual Impairments.
 ECI 787 Orientation and Mobility of the Visually Impaired.
 ECI 788 Structure and Function of the Eye and Use of Low Vision.
 ECI 789 Teaching Braille and Communication Skills.
 ECI 790 Methods and Materials in Visual Impairments.
 ECI 797 Special Problems in Special Education.
 ECI 801 Seminar.
 ECI 802 Seminar in Curriculum and Instruction.
 ECI 803 Advanced Seminar in Reading.
 ECI 804 Seminar on Attention Deficity Hyperactivity Disorder, Research and Treatment.
 ECI 820 Special Problems.
 ECI 830 Independent Study in Curriculum and Instruction.
 ECI 840 Practicum in Curriculum and Instruction.
 ECI 841 Practicum in Mentoring of Teachers.
 ECI 842 Practicum in Instructional Technology - Computers.
 ECI 843 Practicum in Social Studies.
 ECI 844 Practicum in Elementary Education.
 ECI 845 Diagnostic-Prescriptive Practicum in Reading.
 ECI 846 Practicum in Middle Grades Education.
 ECI 847 Practicum in Marketing Education.
 ECI 848 Practicum in Special Education.
 ECI 850 Internship in Curriculum and Instruction.
 ECI 851 Internship in Mentoring.
 ECI 852 Internship in Instructional Technology - Computers.
 ECI 853 Internship in Social Studies.
 ECI 854 Internship in Elementary Education.
 ECI 855 Internship in Reading Education.
 ECI 856 Internship in Middle Grades Education.
 ECI 857 Internship in Marketing Education.
 ECI 858 Internship in Special Education.
 ECI 880 Directed Study in Curriculum and Instruction.
 ECI 885 Doctoral Supervised Teaching.
 ECI 890 Doctoral Preliminary Examination.
 ECI 891 Research Applications in Curriculum and Instruction.
 ECI 892 Doctoral Research Projects.
 ECI 893 Doctoral Supervised Research.
 ECI 895 Doctoral Dissertation Research.
 ECI 899 Doctoral Dissertation Preparation.

Economics

Degrees Offered: Ph.D., M.S., M.A., Master of Economics

GRADUATE FACULTY

Professor J. A. Brandt, Head of the Department of Agricultural and Resource Economics

Professor S. E. Margolis, Head of the Department of Economics

Professor W. N. Thurman, Director of Graduate Programs

Box 8110, (919) 515-7156, wally_thurman@ncsu.edu

Hugh C. Kiger Associate Professor: A. B. Brown

William Neal Reynolds Professor: M. K. Wohlgenant

Professors: S.G. Allen, G. A. Carlson, R. L. Clark, L. E. Danielson, J. E. Easley Jr., E. W. Erickson, E. A. Estes, D. Fisher, D. J. Flath, B. K. Goodwin, T. J. Grennes, A. R. Hall, M. T. Holt, D. M. Holthausen Jr., D. N. Hyman, T. Johnson, C. R. Knoeber, C. L. Moore Sr., R. B. Palmquist, D. K. Pearce, C. D. Safley, R. A. Schrimper, J. J. Seater, M. L. Walden, W. J. Wessels; *Professors Emeriti:* R. C. Brooks, A. J. Coutu, R. M. Fearn, D. M. Hoover, L. A. Ihnen, R. A. King, H. L. Liner, T. E. Nichols Jr., B. M. Olsen, E. C. Pasour Jr., C. R. Pugh, J. A. Seagraves, R. L. Simmons, J. G. Sutherland, W. D. Toussaint, C. D. Turner, R. C. Wells, J. C. Williamson Jr.; *Associate Professors:* D. S. Ball, G. A. Benson, L. A. Craig, P. L. Fackler, W. E. Foster, A. E. Headen Jr., J. S. Lapp, M. C. Marra, M. B. McElroy, C. M. Newmark, A. W. Oltmans, M. A. Renkow, T. Vukina, K. D. Zering; *Associate Professor Emeriti:* H. C. Gilliam Jr.; *Assistant Professor:* T. C. Tsoulouhas

ASSOCIATE MEMBERS OF THE PROGRAM

Professor: D. A. Dickey; *Associate Professors:* J. C. Dutton Jr., E. A. McDermid

The economics graduate program is a joint program of the Department of Agricultural and Resource Economics and the Department of Economics. Emphasis is placed on economic theory and quantitative economic analysis and their application to economic problems. The major fields of specialization are: agricultural economics, econometrics, environmental/resource economics, industrial organization, international economics, labor economics and macro-monetary economics.

Admission Requirements: Minimum background for admission includes intermediate microeconomics and macroeconomics, at least one semester of calculus (two for Ph.D.) and undergraduate statistics. Some students are admitted conditional on their

taking certain prerequisites. The submission of GRE scores is strongly recommended and is required for students applying for financial aid.

Master's Degree Requirements: The Master of Science in agricultural and resource economics and the Master of Arts in economics require core courses in micro-economics (ECG 505 or ECG 700), macroeconomics (ECG 506 or ECG 703), statistics (ST 504) and applied econometrics (ECG 561). Both degree have thesis and elective requirements. The Master of Economics is a non-thesis degree with two options: (1) Ph.D. Preparatory and (2) Applied Economics and Policy Analysis. Both options require a core of ECG 700 (or ECG 505), ECG 703 (or ECG 506), ST 514 and ECG 561. In addition ECG 765 is highly recommended for Option 1 while Option 2 also requires ECG 562. Both options have elective requirements.

Doctoral Degree Requirements: The Ph.D. program requires a minimum of 72 hours and at least six semesters of work beyond the bachelor's degree. Students must pass written comprehensive examinations in micro-economics and macro-economics. Course requirements include two semesters of econometrics and six field courses.

Student Financial Support: Research and teaching assistantships are available and are awarded on a competitive basis. Most of these assistantships go to Ph.D. students. Students applying for assistantships are advised to apply by February 15 for fall admission.

Other Relevant Information: Graduate students on financial support are provided office space or study carrels. Other students may be assigned study carrels if available. All students have access to the economics graduate student computer lab.

GRADUATE COURSES

ECG(PRT) 503 Economics of Recreation.

ECG 504 Monetary and Financial Macroeconomics.

ECG 505 Applied Microeconomic Analysis.

ECG 506 Applied Macroeconomic Analysis.

ECG 507 Microeconomics and the Business Environment.

ECG 508 Macroeconomics and the Business Environment.

ECG 512 Law and Economics.

ECG 515 Environmental and Resource Policy.

ECG 521 Markets and Trade.

ECG 523 Planning Farm and Area Adjustments.

ECG 532 Economics of Trade Unions.

ECG 533 Economics of World Food and Agricultural Policy.

ECG 537 Health Economics.

ECG 540 Economic Development.
 ECG 551 Agricultural Production Economics.
 ECG 555 Managerial Economics.
 ECG(ST) 561 Intermediate Econometrics.
 ECG 562 Topics in Applied Econometrics.
 ECG 570 Analysis of American Economic History.
 ECG 590 Special Topics.
 ECG 624 Topical Problems in Econometrics.
 ECG 630 Independent Study.
 ECG 690 Master's Examination.
 ECG 695 Master's Thesis Research.
 ECG 699 Master's Thesis Preparation.
 ECG 700 Price Theory.
 ECG 701 Advanced Price Theory.
 ECG 702 Prices, Value and Welfare.
 ECG 703 Income and Employment Theory.
 ECG 704 Advanced Income and Employment Theory.
 ECG 705 Monetary Economics.
 ECG 706 Industrial Organization and Control.
 ECG 707 Topics in Industrial Organization.
 ECG 708 History of Economic Thought.
 ECG 710 Theory of Public Finance.
 ECG 715 Environmental and Resource Economics.
 ECG 716 Topics in Environmental and Resource Economics.
 ECG 730 Labor Economics.
 ECG 731 Policy and Research Issues in Labor Economics.
 ECG 740 Advanced Economic Development.
 ECG 741 Agricultural Production and Supply.
 ECG 742 Consumption, Demand and Market Interdependency.
 ECG 748 Theory of International Trade.
 ECG 749 Monetary Aspects of International Trade.
 ECG 750 Economic Decision Theory.
 ECG(ST) 751 Econometrics.
 ECG(ST) 752 Topics in Econometrics.
 ECG 765 Mathematical Methods for Economics.
 ECG 784 Advanced Macroeconomics.
 ECG 785 Monetary Theory.
 ECG 790 Advanced Special Topics.
 ECG 824 Topical Problems in Economics.
 ECG 830 Independent Study.
 ECG 895 Doctoral Dissertation Research.
 ECG 899 Doctoral Dissertation Preparation.

Educational Research and Policy Analysis

For a listing of graduate faculty and program information, see adult and community college education.

Electrical and Computer Engineering

Degrees Offered: Ph.D., M. S., Master of Electrical Engineering

GRADUATE FACULTY

Professor R. M. Kolbas, *Head of the Department*

Professor A. Reisman, *Director of Graduate Programs*

Box 7911, (919) 515-5091; @eos.ncsu.edu

Distinguished University Professor: B. J. Baliga

Graduate Alumni Distinguished Professor: J. B. O'Neal Jr.

Professors: D. P. Agrawal, W. E. Alexander, S. M. Bedair, W. Chou, P. D. Franzon, T. H. Glisson Jr., J. J. Grainger, J. R. Hauser, J. F. Kauffman, K. W. Kim, M. A. Littlejohn, W. Liu, R. Luo, N. A. Masnari, N. F. Matthews, T. K. Miller III, L. K. Monteith, H. T. Nagle Jr., A. A. J. Nilsson, C. M. Osburn, M. C. Ozturk, S. A. Rajala, W. E. Snyder, M. B. Steer, H. J. Trussell, J. J. Wortman; *Visiting Professors:* F. Brglez, J. W. Mink, J. R. Suttle; *Adjunct Professors:* R. K. Cavin III, M. Dutta, S. E. Kerns, J. W. Keyes Jr., M. A. Strocchio, R. J. Trew; *Professors Emeriti:* W. J. Barclay, A. R. Eckels, A. J. Goetze, D. R. Rhodes; *Associate Professors:* S. T. Alexander, G. L. Bilbro, M. Chow, T. M. Conte, A. Duel-Hallen, E. F. Gehringer, R. S. Gyurcsik, A. W. Kelley, D. S. Reeves, J. K. Townsend, I. Viniotis, M. W. White; *Visiting Associate Professors:* J. J. Brickley, T. L. Mitchell; *Adjunct Associate Professors:* J. R. Burke, J. R. Jones, S. S. Lee, J. J. Paulos, D. Temple; *Associate Professors Emeriti:* G. F. Bland, E. G. Manning, W. C. Peterson; *Assistant Professors:* M. E. Baran, A. E. Eichenberger, C. S. Gloster Jr.; *Visiting Assistant Professors:* W. D. Allen, R. T. Kuehn, X. Xu; *Adjunct Assistant Professors:* L. J. Bottomley, D. L. Dreifus, C. A. Hamilton, A. J. Rindos III, P. I. Santiago, C. K. Williams; *Lecturer:* J. C. Sutton III

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: D. L. Bitzer, S. Khorram, D. F. McAllister, J. Narayan, H. G. Perros, W. E. Robbins, J. F. Schetzina, K. Tai, M. A. V. Vouk; *Associate Professors:* E. W. Davis Jr., M. F. M. Stallmann

INTERINSTITUTIONAL ADJUNCT GRADUATE FACULTY

S. Chen, K. Daneshvar, J. H. Kim, P. Lala, R. Z. Makki

Admissions Requirements: Admission to the M.S. program requires a B.S. in electrical engineering, computer engineering or computer science, an overall undergraduate GPA of at least 3.2, The minimum acceptable TOEFL score for admission to the M.S. program is 575. Admission is further limited by available room in the elected program of study and meeting the minimum above requirements alone does not guarantee admission.

Admission to the Ph.D. program requires a B.S. or M.S. in electrical engineering, computer engineering or computer science with an overall GPA of at least 3.5. (NOTE: Only exceptional students are admitted without first having an M.S. degree.) The minimum acceptable TOEFL score for admission to the Ph.D. program is 625. Admission is further limited by available room in the elected program of study, and meeting the minimum requirements as given above does not guarantee admission.

Master's Degree Requirements: A thesis is optional. Students electing the Option B non-thesis option must meet core course requirements and have at least six credit hours of 600-level ECE courses.

Doctoral Degree Requirements: Approximately 30 credit hours are required beyond the M.S. degree or 60 credit hours beyond the B.S. degree. A minimum of 21 of the 30 credit hours or a minimum of 45 of the 60 credit hours must be in scheduled courses. A minor is not required but may be elected. Additional course restrictions apply if a minor is not elected.

The department wishes to evaluate a Ph.D. student's research potential as quickly as possible. Consequently, all Ph.D. students are required to pass a qualifying review before the end of their third semester of study. This review is based on the student's academic performance to date and the results of a project with one of their committee members. Results are presented to the committee in both written and oral form. Based on this review, the committee will decide if the student may continue in the Ph.D. program.

Student Financial Support: The department offers financial support to qualified students in the form of teaching assistantships, research assistantships, fellowships and tuition remission.

GRADUATE COURSES

ECE (CSC) 501 Operating Systems Principles.
ECE(CSC) 505 Design and Analysis of Algorithms.
ECE(CSC) 506 Architecture of Parallel Computers.
ECE(CSC) 510 Software Engineering.
ECE(CSC) 517 Object-oriented Languages and Systems.
ECE 520 Digital ASIC Design.
ECE 521 Computer Design and Technology.
ECE 549 RF Design for Wireless.
ECE(PY) 552 Introduction to the Structure of Solids.
ECE(CSC) 570 Computer Networks.
ECE(CSC) 572 Introduction to Computer Communications.
ECE(CSC) 576 Telecommunications Systems Engineering.
ECE(CSC) 579 Introduction to Computer Performance Modelling.
ECE 591 Special Topics in Electrical Engineering
ECE 592 Special Topics in Electrical and Computer Engineering.
ECE 633 Individual Topics in Electrical Engineering.
ECE 634 Individual Studies in Electrical Engineering.
ECE 685 Master's Supervised Teaching.
ECE 693 Master's Supervised Research.
ECE 695 Master's Thesis Research.
ECE 699 Master's Thesis Preparation.
ECE 703 Instrumentation Circuits.
ECE 704 Logic Design for Testability.
ECE 711 Analog Electronics.
ECE 712 Analog VLSI.
ECE 713 Digital Signal Processing.
ECE 714 Random Processes.
ECE 715 Digital Communications.
ECE 716 System Control Engineering.
ECE (MAE,TE) 717 Multivariate Linear Systems Theory.
ECE 718 Computer-aided Circuit Analysis.
ECE 719 Microwave Circuits Design.
ECE 722 Electronic Properties of Solid-state Materials.
ECE 723 Optical Properties of Semiconductors.
ECE 724 Electronic Properties of Solid-state Devices.
ECE 725 Optical Signal Processing.
ECE 726 Advanced Feedback Control.
ECE(PY) 727 Semiconductor Thin Films Technology.
ECE 728 Preparation of Electronic Materials.
ECE 729 Growth of Thin Films from the Vapor Phase.
ECE 730 Physical Electronics.

ECE 731 Principles of Transistor Devices.
 ECE 732 Principles of Microwave Circuits.
 ECE 733 Digital Electronics.
 ECE 734 Switchmode DC-to-DC Converters.
 ECE 735 Advanced Solid-state Device Theory.
 ECE 736 Power System Stability and Control.
 ECE 737 Characterization of High-speed Devices.
 ECE 738 Integrated Circuits Technology and Fabrication.
 ECE 739 Integrated Circuits Technology and Fabrication Laboratory.
 ECE 740 Electromagnetic Fields.
 ECE 741 Sequential Machines.
 ECE 742 Artificial Neural Networks.
 ECE 743 High Performance Multicomputer Architecture.
 ECE 744 Design of Electronic Packaging and Interconnects.
 ECE 746 VLSI Systems Design.
 ECE 747 Digital Signal Processing Architecture.
 ECE(CSC) 748 Parallel Processing.
 ECE 749 RF Design for Wireless.
 ECE 750 Power System Operation and Control.
 ECE 751 Detection and Estimation Theory.
 ECE 753 Computer Analysis of Large-scale Power Systems.
 ECE 755 Fault Tolerant Computing.
 ECE 756 High Performance VLSI Design.
 ECE 757 Principles of MOS Transistors.
 ECE 758 Digital Image Systems.
 ECE 759 Pattern Recognition.
 ECE 760 Multidimensional Digital Signal Processing.
 ECE 761 Design Automation for VLSI.
 ECE 762 Advanced Digital Communications Systems.
 ECE 763 Computer Vision.
 ECE 764 Digital Image Processing.
 ECE(CSC) 776 Performance Evaluation of Computer Networks.
 ECE(CSC) 777 Telecommunications Network Design.
 ECE 778 Optical Fiber Communications.
 ECE(CSC) 779 Advanced Computer Performance Modelling.
 ECE 781, 782 Special Studies in Electrical Engineering.
 ECE 791 Special Topics in Electrical Engineering.
 ECE 792 Special Topics in Electrical Engineering.
 ECE 801 Seminar in Electrical and Computer Engineering.
 ECE 802 Seminar in Circuits and Systems.
 ECE 803 Seminar in Computer Engineering.
 ECE 804 Seminar in Communications and Signal Processing.
 ECE 805 Seminar in Solid State.

ECE 833 Individual Topics in Electrical and Computer Engineering.
ECE 834 Individual Studies in Electrical and Computer Engineering.
ECE 885 Doctoral Supervised Teaching.
ECE 890 Doctoral Preliminary Examination.
ECE 893 Doctoral Supervised Research.
ECE 895 Doctoral Dissertation Research.
ECE 899 Doctoral Dissertation Preparation.

Electrical Engineering

For a listing of graduate faculty and program information, see electrical and computer engineering.

Elementary Education

For a listing of graduate faculty and program information, see curriculum and instruction.

Engineering

The College of Engineering offers a program leading to the Master of Engineering. This is primarily an off-campus program. This Option B program requires 30 credit hours and has no residency, final oral examination or thesis requirements. Requirements also include two core courses and a minimum of three courses in a specific concentration. A minimum of five courses, selected from a list specified and approved by the designating department, is required for a designated concentration on the transcript. The VideoBased Engineering Education (VBEE) program offers, each semester, courses, live or by videotape, which may be applied toward the degree.

English

Degrees Offered: M.A. in English, M.S. in Technical Communication

GRADUATE FACULTY

Professor T. D. Lisk, Head of the Department

Professor R. V. Young Jr., Director of Graduate Programs

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Associate Professor S. B. Katz, Coordinator, M. S. in Technical Communication

Professors: B. J. Baines, J. W. Clark Jr., J. Ferster, J. A. Gomez, J. M. Grimwood, A. H. Harrison, M. T. Hester, L. T. Holley, J. J. Kessel, L. H. MacKethan, W. E. Meyers, C. R. Miller, C. A. Prioli, L. Smith, J. J. Smoot, A. F. Stein, J. N. Wall Jr.; **Professors Emeriti:** G. W. Barrax, P. E. Blank Jr., L. S. Champion, J. D. Durant, M. Halperen, H. G. Kincheloe, A. S. Knowles, B. G. Koonce Jr., F. H. Moore, M. S. Reynolds, W. B. Toole III, M. C. Williams, P. J. Williams; **Associate Professors:** E. Y. Amiran, L. J. Betts Jr., M. P. Carter, D. H. Covington, A. Davis-Gardner, C. Gross, D. J. Herman, M. F. King, R. C. Kochersberger Jr., R. C. Lane, D. L. Laryea, J. E. Morrison, C. Nwankwo, M. E. N. Orr, A. M. Penrose, J. O. Pettis, J. D. Durant, J. J. Small, J. F. Thompson, H. C. West, D. B. Wyrick; **Associate Professors Emeriti:** E. D. Clark Sr., E. P. Dandridge Jr., H. A. Hargrave, C. E. Moore, N. G. Smith; **Assistant Professors:** R. S. Dicks, C. R. Haller, N. Halpern, S. M. Katz, D. E. Keetley, L. S. May, B. S. Mehlenbacher, J. D. Morillo, M. T. Pramaggiore, S. M. Setzer, L. R. Severin, K. Shepherd-Barr, E. R. Thomas, C. A. Warren; **Visiting Assistant Professor:** W. M. Henderson

ENGLISH

The Master of Arts program offers course work in English and American literature, rhetoric and composition, linguistics and creative writing. It can serve either as a complete course of study or as the first year of study toward a doctoral degree at another institution.

Admission Requirements: Applicants should submit GRE scores (General Aptitude Test) and a writing sample. Undergraduate preparation should include 24 semester hours in English, with 12 of these hours in upper-division literature courses.

Requirements for M.A. in English: All students take a distribution of four courses, one each in English literature before 1660, English literature after 1660, American literature and a fourth category including composition theory, rhetoric, linguistics and literary theory. In addition, all students must take an introduction to research and bibliography, pass a language requirement, write a thesis and pass an oral exam on the thesis research.

Beyond these basic requirements, the program permits several emphases. Students interested primarily in the study of literature take additional courses in literature for a total of eight courses. Students interested in creative writing may substitute three workshops in creative writing for two literature courses and present a creative work or series of short works as their thesis. Students interested in the study and teaching of writing may take the composition concentration, which requires specific courses in composition, rhetoric and linguistics; the thesis is on a topic in one of these areas.

Students interested in language structure and variation may take the linguistics concentration, which requires four courses in language study and five courses in literature. The thesis may be pure linguistics or its application in rhetoric, composition or literature.

Student Financial Support: Teaching assistantships are available for promising students. These students take a course in teaching Freshman English (ENG 624) in the fall semester and, under the supervision of experienced teachers, devote half time in subsequent semesters to teaching freshman composition. ENG 624 gives graduate credit but does not count toward fulfillment of degree requirements.

Other Relevant Information: For students who hold "A" certification from the N. C. Department of Public Instruction the department offers the M.A. with Graduate ("G") Certification requiring 30 semester hours of graduate credit in English, as outlined above, and 9 semester hours of graduate credit in Education. Students and faculty in the Department of English are eligible for fellowships to participate in programs sponsored by the Folger Institute of Renaissance and Eighteenth-Century Studies, which is located in Washington, DC, at the Folger Shakespeare Library.

TECHNICAL COMMUNICATION

The Master of Science in technical communication is designed to prepare professional communicators for advanced positions in industry and research organizations; with appropriate electives, students can prepare for careers in software documentation, environmental communication, medical writing, industrial training in writing and editing, publications management and related areas.

Admission Requirements: Applicants should submit a resume and a writing sample. Prerequisites for the program are basic editing, technical writing and computer literacy (ENG 214, ENG 331, and CSC 200).

Requirements for M.S. in Technical Communication: The program requires 33 semester hours: 15 hours in the fields of technical writing, publication management, rhetoric and a projects course; the remaining hours are taken in applications, theory and methods and cross-disciplinary courses. Students must also satisfy a requirement for one semester of professional work experience.

Student Financial Support: Teaching assistantships are available for promising students. These students take a course in teaching technical communication (ENG 666) in the fall semester and, under the supervision of experienced teachers, devote half time in subsequent semesters to teaching technical communication. ENG 666 gives graduate credit but does not count toward fulfillment of degree requirements.

GRADUATE COURSES

- ENG 509 Old English Literature.
- ENG 510 Middle English Literature.
- ENG 511 Theory and Research in Composition.
- ENG 512 Theory and Research in Professional Writing.
- ENG 513 Empirical Research in Composition.
- ENG(COM) 514 History of Rhetoric.
- ENG 515 Rhetoric of Science and Technology.
- ENG(COM) 516 Rhetorical Criticism: Theory and Practice.
- ENG 517 Advanced Technical Writing, Editing and Document Design.
- ENG 518 Publication Management for Technical Communicators.
- ENG 519 Online Information Design and Evaluation.
- ENG 520 Science Writing for the Media.
- ENG 521 Modern English Usage.
- ENG 522 Linguistics and Literacy.
- ENG 523 Language Variation Research Seminar.
- ENG 524 Introduction to Linguistics.
- ENG 525 Variety in Language.
- ENG 526 History of the English Language.
- ENG 527 Critical Discourse Analysis.
- ENG 528 Language Change Research Seminar.
- ENG 529 16th-century Non-dramatic English Literature.
- ENG 530 17th-century English Literature.
- ENG 531 American Colonial Literature.
- ENG(FL) 539 Seminar in World Literature.
- ENG 540 History of Literary Criticism.
- ENG 541 Contemporary Literary Theory.
- ENG 548 African-American Literature.
- ENG 549 Modern African Literature.
- ENG 550 English Romantic Period.
- ENG 551 Chaucer.
- ENG 555 American Romantic Period.
- ENG 558 Studies in Shakespeare.
- ENG 560 Victorian Poetry and Critical Prose.
- ENG 561 Milton.
- ENG 562 18th-century English Literature.
- ENG 563 18th-century English Novel.
- ENG 564 Victorian Novel.
- ENG 565 American Realism and Naturalism.
- ENG 570 20th-century British Prose.
- ENG 571 20th-century British Poetry.
- ENG 572 Modern British Drama.

ENG 573 Modern American Drama.
ENG 574 Comparative Drama.
ENG 575 Southern Writers.
ENG 576 20th-century American Poetry.
ENG 577 20th-century American Prose.
ENG 578 English Drama to 1642.
ENG 579 Restoration and 18th-century Drama.
ENG 580 Literary Postmodernism.
ENG 582 Studies in Literature.
ENG 583 Studies in Composition and Rhetoric.
ENG 584 Studies in Linguistics.
ENG 585 Studies in Film.
ENG 586 Studies in Theory.
ENG 588 Fiction Writing Workshop.
ENG 589 Poetry Writing Workshop.
ENG 590 Studies in Creative Writing.
ENG 624 Problems in College Composition.
ENG 636 Directed Readings.
ENG 666 Teaching Methods for Professional Writing.
ENG 669 Bibliography and Methodology.
ENG 675 Projects in Technical Communication.
ENG 685 Master's Supervised Teaching.
ENG 693 Master's Supervised Research.
ENG 695 Master's Thesis Research.
ENG 699 Master's Thesis Preparation.

English Education

For a listing of graduate faculty and program information, see curriculum and instruction.

Entomology

Degrees Offered: Ph.D., M.S., Master of Entomology

GRADUATE FACULTY

Professor J. D. Harper, Head of the Department

Professor W. M. Brooks, Director of Graduate Programs

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Blanton J. Whitmire Professor: C. Schal

Philip Morris Professor: J. W. Van Duyen

William Neal Reynolds Professors: F. L. Gould, G. G. Kennedy

Professors: J. T. Ambrose, C. S. Apperson, J. S. Bacheler, J. R. Baker, J. R. Bradley Jr., R. L. Brandenburg, L. L. Deitz, F. P. Hain, R. J. Kuhr, J. R. Meyer, B. M. Parker, R. M. Roe, K. A. Sorensen, P. S. Southern, R. E. Stinner, J. F. Walgenbach; **Adjunct Professors:** D. M. Jackson, P. M. Marsh, D. E. Sonenshine; **Professors Emeriti:** R. C. Axtell, W. V. Campbell, M. H. Farrier, K. L. Knight, W. J. Mistic Jr., H. B. Moore Jr., H. H. Neunzig, R. L. Rabb, R. L. Robertson, C. F. Smith, C. G. Wright; **Associate Professor:** M. E. Barbercheck; **Adjunct Associate Professors:** D. A. Herbert Jr., C. A. Nalepa; **Associate Professor Emeritus:** R. C. Hillmann; **Assistant Professors:** D. B. Orr, C. E. Sorenson, D. W. Watson, B. M. Wiegmann; **Visiting Assistant Professors:** D. W. Keever, M. G. Waldvogel; **Adjunct Assistant Professors:** R. C. McDonald, D. M. Thompson, M. D. Tomalski; **Senior Researcher:** F. L. Hastings

ASSOCIATE MEMBER OF THE PROGRAM

Professors: R. B. Leidy, H. M. Linker; **Assistant Professor:** R. L. Rose

Course offerings or research facilities are available in the following areas: agricultural entomology, apiculture, behavior, biological control, ecology, forest entomology, host-plant resistance, insect pathology, medical and veterinary entomology, pest management, physiology, molecular biology, population dynamics, soil entomology, urban entomology, systems analysis, systematics and toxicology.

Admission Requirements: A minimum score of 1000 (verbal plus quantitative) is necessary for admission to the M.E. or M.S. program while a score of 1100 is required for the Ph.D. program. Students are expected to have a background in biology in addition to appropriate courses in chemistry, biochemistry, mathematics, and physics. A "B" average (3.0 GPA) is required in biology courses and an overall 3.0 GPA during the last 2 years of the undergraduate program.

Student Financial Support: Graduate assistantships and other forms of aid are available to students as described in the Fellowships and Graduate Assistantships section of the *Graduate Catalog*.

Other Relevant Information: Admission is permitted only after acceptable applicants have secured an advisor and appropriate financial support. All students are expected to begin their research as soon as possible upon arrival in the department.

GRADUATE COURSES

ENT(ZO) 509 Ecology of Stream Invertebrates.
ENT 601 Seminar.
ENT 620 Special Problems.
ENT 641 Practicum.
ENT 685 Master's Supervised Teaching.
ENT 690 Master's Examination.
ENT 693 Master's Supervised Research.
ENT 695 Master's Thesis Research.
ENT 699 Master's Thesis Preparation.
ENT 702 Insect Systematics.
ENT 703 Insect Morphology and Physiology.
ENT 720 Insect Pathology.
ENT(TOX) 722 Insecticide Toxicology.
ENT 731 Insect Ecology.
ENT 741 Immature Insects.
ENT 750 Fundamentals of Insect Control.
ENT 762 Insect Pest Management in Agricultural Crops.
ENT(FOR) 765 Advanced Forest Entomology.
ENT(ZO) 782 Medical and Veterinary Entomology.
ENT 791 Special Topics in Entomology.
ENT 801 Seminar.
ENT 820 Special Problems.
ENT 841 Practicum.
ENT 885 Doctoral Supervised Teaching.
ENT 890 Doctoral Preliminary Examination.
ENT 893 Doctoral Supervised Research.
ENT 895 Doctoral Dissertation Research.
ENT 899 Doctoral Dissertation Preparation.

Fiber and Polymer Science

Degree Offered: Ph.D.

GRADUATE FACULTY

Professor C. D. Livengood, Program Director

Box 8301, (919) 515-3057, charles_livengood@ncsu.edu

Professors: R. L. Barker, S. K. Batra, K. R. Beck, D. R. Buchanan, C. L. Bungardner, T. G. Clapp, A. H. M. El-Shiekh, H. S. Freeman, R. E. Fornes, P. L. Grady, B. S. Gupta, H. Hamouda, H. B. Hopfenberg, S. M. Hudson, T. J.

Little, C. D. Livengood, G. N. Mock, H. G. Olf, W. Oxenham, S. T. Purrington, C. B. Smith, E. O. Stejskal, M. W. Suh, M. H. Theil, A. E. Tonelli, S. C. Winchester Jr.; *Professors Emeriti*: J. F. Bogdan, D. M. Cates, D. W. Chaney, J. A. Cuculo, R. D. Gilbert, D. S. Hamby, S. P. Hersh, P. R. Lord, R. McGregor, M. H. M. Mohamed, H. A. Rutherford, V. T. Stannett, W. C. Stuckey Jr., C. Tomasino, P. A. Tucker Jr., W. K. Walsh, W. M. Whaley, C. F. Zorowski; *Associate Professors*: C. M. Balik, P. Banks-Lee, T. K. Ghosh, H. H. A. Hergeth, W. J. Jasper, S. A. Khan, J. W. Rucker, J. P. Rust, A. M. Seyam; *Associate Professor Emeritus*: T. G. Rochow; *Assistant Professors*: C. B. Gorman, M. G. McCord, Y. Qiu, M. Srinivasarao, R. A. Venditti; *Adjunct Assistant Professor*: A. C. Bullerwell

Fiber and polymer science is a multidisciplinary program bringing together the disciplines of mathematics, chemistry and physics and the application of engineering principles for the development of independent scholars versed in all aspects of fiber materials science. Thus, fiber and polymer science is concerned with the formation of and the mechanical, physical and chemical properties of polymeric materials, fibers produced from them, fiber assemblies in one-, two- and three-dimensional forms, and fiber reinforced composites, as well as the utilization thereof.

Admission Requirements: Students majoring in the physical sciences, engineering, mathematics, textiles and having a master's degree will normally qualify for admission. For exceptionally qualified students, the master's degree requirement may be waived, and the student can be admitted directly into the Ph.D. program.

Doctoral Degree Requirements: Credit-hour requirements for the Doctor of Philosophy degree are 72. (Up to 18 hours from an M.S. may be applied against the 72.) Students are admitted to candidacy for the Ph.D. degree after passing a series of written cumulative examinations, completing a scholarly critique of existing knowledge in the field of specialization, and orally defending a research proposal. A written examination in a minor field may be accepted in place of the scholarly critique. They must also have passed an English technical writing course during their college career.

Student Financial Support: Financial aid in the form of assistantships and fellowships is normally available for all full-time students.

Other Relevant Information: In 1991, the College of Textiles moved to its new 298,000 square foot complex, now valued at over \$50 million, which houses exceptional teaching, research, computer, and library facilities. With a graduate faculty of 45 and over \$7,000,000 spent on research in 1997, opportunities abound ranging from preserving the local environment (research sponsored by EPA) to exploring outer space (Mars Mission Research Center sponsored by NASA).

COURSE OFFERINGS (Extensive use may be made of graduate course offerings in other colleges on campus when developing the minor field.)

GENERAL COURSES

FPS(TC, TE, TMS) 792 Special Topics in Fiber Science.
FPS 801 Seminar.
FPS 830 Independent Study.
FPS 876 Special Projects in Fiber and Polymer Science.
FPS 885 Doctoral Supervised Teaching.
FPS 890 Doctoral Preliminary Examination
FPS 893 Doctoral Supervised Research
FPS 895 Doctoral Dissertation Research
FPS 899 Doctoral Dissertation Preparation
TC 704 Fiber Formation--Theory and Practice.
TC(CH,MAT) 762 Physical Chemistry of High Polymers--Bulk Properties.
TC 791 Special Topics in Textile Science.
TMS 500 Fiber and Polymer Microscopy.
TMS(FPS) 761 Mechanical and Rheological Properties of Fibrous Material.
TMS(FPS, MAT) 763 Characterization of Structure of Fiber Forming Polymers.

COURSES IN AREAS OF SPECIALIZATION

Polymer Chemistry and Synthesis

TC 530 The Chemistry of Textile Auxiliaries.
TC(MAT) 561 Organic Chemistry of Polymers.
TC 720 Chemistry of Dyes and Color.
TC 721 Dye Synthesis Laboratory.
TC 525 Dyeing Cellulose.

Polymer Physics and Physical Chemistry

TC 504 Fiber Formation--Theory and Practice.
TC 705 Theory of Dyeing.
TC(CH,MAT) 762 Physical Chemistry of High Polymers--Bulk Properties.
TC(CHE) 769 Polymers, Surfactants and Colloidal Materials.
TC(CH,MAT) 772 Physical Chemistry of High Polymers--Solution Properties.
TC(CHE) 779 Diffusion in Polymers.
TC(FPS,TC,TE) 792 Special Topics in Fiber Science.
TMS 500 Fiber and Polymer Microscopy.

Mechanics of Textile Materials and Processes

FPS(TE,TT) 781 Mechanics of Twisted Structures.
FPS(TE,TT) 782 Mechanics of Fabric Structures.
TMS(TE, FPS) 765 Textile Composites.
TT(TE) 520 Yarn Processing Dynamics.
TT(TE) 549 Warp Knit Engineering and Structural Design.

TT(TE) 550 Production Mechanics and Properties of Woven Fabrics.
TT(FPS) 720 Yarn Production Properties.

Fisheries and Wildlife Sciences

Degrees Offered: M.S., Master of Fisheries and Wildlife Sciences

GRADUATE FACULTY

Professor R. L. Noble, Coordinator

Professor D. L. Holley Jr., Director of Graduate Programs, Forestry
Box 8002, (919) 515-2892

Professor B. J. Copeland, Director of Graduate Programs, Zoology
Box 7617, (919) 515-4589

Professors: G. T. Barthalmus, P. T. Bromley, P. D. Doerr, J. E. Easley Jr., E. C. Franklin, J. F. Gilliam R. A. Lancia, J. M. Miller, K. H. Pollock, J. A. Rice;
Professors Emeriti: D. A. Adams, D. W. Hayne; *Associate Professors:* M. J. Groom, J. M. Hinshaw, R. G. Hodson, E. J. Jones, T. M. Losordo, S. C. Mozley, R. A. Powell, C. V. Sullivan; *Associate Professors (USDI):* J. A. Collazo, J. E. Hightower, T. R. Simons; *Assistant Professors:* R. J. Borski, H. V. Daniels, J. R. Godwin, G. R. Hess, P. S. Rand

The fisheries and wildlife sciences degrees are offered through the Fisheries and Wildlife Science program, an intercollege program administered by the Departments of Forestry and Zoology. The degrees emphasize assessment, biology, ecology and management of fish and wildlife species and their habitats.

Admissions Requirements: Application for admission is made through the Departments of Forestry or Zoology. Minimum requirements include a graduate record examination score of 1000 on the verbal and quantitative sections. Admission is contingent upon acceptance by an advisor. Exceptions to minimum requirements may be made for students with special backgrounds.

Master's Degree Requirements: The Master of Fisheries and Wildlife Sciences degree consists of a minimum of 36 credits, which may include up to eight hours of special problems and seminars. A professional paper is required. The M.S. degree program may include up to eight hours of research and seminars. A research-based thesis is required. Further requirements may be imposed by the advisory committee and/or department.

Student Financial Support: Graduate research and teaching assistantships are offered for qualified students through participating departments. Commitments for assistantships are normally made at the time of admission to graduate study.

Other Relevant Information: Research near campus is facilitated by excellent field, laboratory and computer resources. Off-campus research is conducted at the Pamlico Aquaculture Field Laboratory, research and extension centers in the east and west, and at facilities of state and federal agencies and private organizations.

GRADUATE COURSES

- FW(ZO) 515 Fish Physiology.**
- FW(ZO) 553 Principles of Wildlife Science.**
- FW(ZO) 554 Wildlife Field Studies.**
- FW(ZO) 586 Aquaculture I.**
- FW(ZO) 587 Aquaculture I Laboratory.**
- FW(FOR) 602 Seminar in Wildlife Management.**
- FW 685 Master's Supervised Teaching.**
- FW 690 Master's Examination.**
- FW 693 Master's Supervised Research.**
- FW 695 Master's Thesis Research.**
- FW 699 Master's Thesis Preparation.**
- FW(FOR) 785 Advanced Wildlife Habitat Management.**

COURSES FROM ASSOCIATED DEPARTMENTS

- ZO 501 Ornithology.**
- ZO(ENT) 509 Ecology of Stream Invertebrates**
- ZO 519 Limnology.**
- ZO 542 Herpetology.**
- ZO 544 Mammalogy.**
- ZO(MEA) 550 Principles of Biological Oceanography.**
- ZO 603 Aquatic Ecology Seminar.**
- ZO(ST) 710 Sampling Animal Populations.**
- ZO 721 Fishery Science.**
- ZO 726 Quantitative Fisheries Management.**
- ZO(MEA) 756 Ecology of Fishes.**
- ZO 784 Advanced Topics in the Study of Mammals.**
- ZO 789 Advanced Limnology.**

Food Science

Degrees Offered: Ph.D., M.S. Master of Food Science

GRADUATE FACULTY

William Neal Reynolds Professor K. R. Swartzel, *Head of the Department*
Professor B. W. Sheldon, *Director of Graduate Programs*
Box 7624, (919) 515-2971

Graduate Alumni Distinguished Professors and William Neal Reynolds Professors:
T. R. Klaenhammer, H. E. Swaisgood

Professors: J. C. Allen, D. E. Carroll Jr., G. L. Catignani, E. A. Foegeding, P. M. Foegeding, A. P. Hansen, T. C. Lanier, D. K. Larick, J. L. Oblinger, D. H. Pilkington, J. E. Rushing, L. G. Turner, D. R. Ward, C. T. Young; *Professors (USDA):* H. P. Fleming, R. F. McFeeters, T. H. Sanders, W. M. Walter Jr.; *Adjunct Professor:* J. P. Adams; *Professors Emeriti:* L. W. Aurand, H. R. Ball Jr., T. A. Bell, T. N. Blumer, R. E. Carawan, E. S. Cofer, M. E. Gregory, M. W. Hoover, I. D. Jones, V. A. Jones, W. M. Roberts, S. J. Schwartz, M. L. Speck, F. R. Tarver Jr., F. B. Thomas; *Associate Professors:* L. C. Boyd, P. A. Curtis; *Assistant Professors:* C. R. Daubert, B. E. Farkas, D. P. Green, L.-A. Jaykus, K. M. Keener, K. P. Sandeep

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: H. M. Hassan, F. T. Jones, C. J. Lackey; *Professor (USDA):* H. E. Pattee; *Associate Professor:* T. J. Hoban; *Assistant Professor:* S. A. Hale

The department's professional activities include teaching, research, and extension functions. The program provides an educational, research, and informational center in food science for North Carolina and the nation. The department also houses three research centers, the Southeastern Dairy Foods Research Center, the Center for Aseptic Processing and Packaging Studies and the Michael Foods Single Sponsored Laboratory. Course offerings and research facilities are available in the following areas: chemistry-biochemistry, engineering, microbiology, nutrition and processing technology.

Admissions Requirements: To be admitted, a student should be a graduate of an accredited program in food science or the equivalent. Graduates of other majors can be admitted but will be required to make up certain undergraduate deficiencies without graduate credit. The best qualified applicants will be accepted up to the number of spaces that are available or new students.

Master's Degree Requirements: A master's program must include courses from at least 2 of the following categories: chemistry-biochemistry, engineering, microbiology, nutrition and processing technology. No fewer than 6 credits must be at the 600 level. A minor is required. Credits for the minor are variable depending upon the requirements of the minor department or program.

Doctoral Degree Requirements: A doctoral program must include courses from at least 3 of the categories listed above (or equivalent courses at another university). Courses must be selected from groups embracing one principal subject of concentration, the major, and from a cognate field, the minor. Total credits and credits for the minor are not specified and will vary depending on the needs of the student. All doctoral students are required to pass a departmental administered written preliminary exam, designed to evaluate a Ph.D. student's general knowledge and comprehension of food science.

Student Financial Support: Graduate assistantships and other forms of student aid available to students in this program are described elsewhere in the Graduate Catalog.

Other Relevant Information: Students are encouraged to make personal contact with individual faculty whose research program is of interest to them. The department

provides a *Graduate Studies in Food Science* brochure describing each faculty member's program for this purpose.

GRADUATE COURSES

FS 591 Special Problems in Food Science.

FS 592 Special Research Problems in Food Science.

FS 620 Special Problems.

FS 623 Special Research Problems.

FS 685 Master's Supervised Teaching.

FS 690 Master's Examination.

FS 693 Master's Supervised Research.

FS 695 Master's Thesis Research.

FS 699 Master's Thesis Preparation.

FS 704 Food Proteins and Enzymes.

FS 705 Physical and Chemical Properties of Muscle Foods.

FS(NTR) 706 Vitamin Metabolism.

FS 709 Food Lipids.

FS 722 Microbial Food Safety.

FS(MB) 725 Fermentation Microbiology.

FS(NTR) 730 Human Nutrition.

FS 751 Food Ingredient Technology in Product Development.
 FS 753 Food Laws and Regulations.
 FS 780 Seminar in Food Science.
 FS(BAE) 785 Food Rheology.
 FS 791 Special Problems in Food Science.
 FS 792 Special Research Problems in Food Science.
 FS 820 Special Problems.
 FS 823 Special Research Problems.
 FS 885 Doctoral Supervised Teaching.
 FS 890 Doctoral Preliminary Examination.
 FS 893 Doctoral Supervised Research.
 FS 895 Doctoral Dissertation Research.
 FS 899 Doctoral Dissertation Preparation.

Forestry

Degrees Offered: Ph.D., M.S., Master of Forestry, Master of Fisheries and Wildlife Sciences, Master of Natural Resources

GRADUATE FACULTY

Professor F. W. Cubbage, *Head of the Department*
Professor D. L. Holley Jr., *Director of Graduate Programs*
 Box 8002, (919) 515-7560, holley@cfr.cfr.ncsu.edu

Carl Alwin Schenck Professor: H. L. Allen Jr.
Distinguished University Professor: E. B. Cowling
Edwin F. Conger Professor: R. R. Sederoff

Professors: R. I. Bruck, A. W. Cooper, F. W. Cubbage, H. A. Devine, P. D. Doerr, E. C. Franklin, D. J. Frederick, L. F. Grand, J. D. Gregory, F. P. Hain, A. E. Hassan, D. L. Holley Jr., J. B. Jett Jr., E. J. Jones, S. Khorram, J. G. Laarman, R. A. Lancia, R. Lea, J. R. McGraw, S. E. McKeand, R. L. Noble, J. D. Wellman, A. G. Wollum, II; *Professor (USDA):* F. E. Bridgwater Jr.; *Adjunct Professors:* G. L. DeBarr, G. F. Dutrow, P. Farnum, J. D. Hair, J. R. Jorgensen, S. Linder, R. W. Stonecypher; *Professors Emeriti:* D. A. Adams, C. B. Davey, J. W. Duffield, W. L. Hafley, W. T. Huxster Jr., W. D. Miller, L. A. Nelson, T. O. Perry, R. J. Preston, P. A. Sanchez, L. C. Saylor, B. J. Zobel; *Associate Professors:* R. C. Abt, H. V. Amerson, G. B. Blank, R. R. Braham, L. J. Frampton Jr., B. Goldfarb, C. R. McKinley, J. P. Roise, A. M. Stomp, R. J. Weir; *Research Associate Professors:* W. S. Dvorak, B. Liu, R. W. Whetten; *Associate Professor (USDA):* M. A. Buford, P. M. Dougherty; *Associate Professor (USDI):* J. A. Collazo; *Visiting Associate Professor:* G. R. Hodge; *Adjunct Associate*

Professors: D. L. Bramlett, R. G. Campbell, J. E. De Steiguer, C. C. Lambeth, D. L. Loftis, J. N. Woodman; **Assistant Professors:** J. L. Bettis Sr., H. M. Cheshire, L. T. Henry, G. Hess, D. J. Robison; **Research Assistant Professor:** D. M. O'Malley; **Assistant Professor (USDA):** W. D. Smith; **Visiting Assistant Professors:** B. A. Bergmann, M. J. Ducey, R. E. Holman, B. Li, S.C. McKelvey, T. H. Shear; **Adjunct Assistant Professors:** M. C. Conner, T. P. Holmes, W. E. Ladrach, R. B. McCullough, D. E. Mercer, R. C. Purnell, K. R. Roeder, M. M. Schoeneberger, D. N. Wear

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: P. T. Bromley, L. E. Hinesley, E. A. Wheeler; **Associate Professors:** R. A. Powell, B. E. Wilson; **Associate Professor (USDI):** T. R. Simons

The department offers training in all of the major sub-disciplines of forest-related science and management. Considerable flexibility is allowed in developing graduate programs tailored to the student's objectives.

Admission Requirements: All parts of the application, including the GRE general test, are considered in making decisions. Admission is competitive and depends on the willingness of at least one member of the faculty to serve as major professor. An undergraduate degree in forestry is not required.

Master's Degree Requirements: Course work requirements range from 30 to 36 credits depending on the specific master's option. Students without an appropriate background will require additional preparatory work.

Doctoral Degree Requirements:

As a rule, students must complete a master's degree before entering the Ph.D. program. However, exceptionally well-prepared students may petition to have their degree objective changed to Ph.D. before completing the master's degree. In addition to the dissertation, Ph.D. programs typically require 30 credits of course work beyond the master's degree.

Student Financial Support: Merit-based research assistantships are available every year in most fields of specialization. Stipend levels allow students to graduate without incurring significant debt. Those who begin without an assistantship are considered for funding as projects become available.

Other Relevant Information: Every graduate student must meet the following three requirements: (1) register for a 1-credit research methodology course, FOR 603 or 803, in the first semester, (2) meet a one-time teaching requirement by assisting a

faculty member teach an undergraduate forestry course and (3) begin the final oral exam with a seminar to the department based on work accomplished during the graduate program.

GRADUATE COURSES

FOR 601 Graduate Seminar.

FOR(FW) 602 Seminar in Wildlife Management.

FOR 603 Seminar in Forest Research.

FOR 610 Special Topics.

FOR 615 Advanced Special Topics.

FOR 685 Master's Supervised Teaching.

FOR 690 Master's Examination.

FOR 693 Master's Supervised Research.

FOR 695 Master's Thesis Research.

FOR 699 Master's Thesis Preparation.

FOR 701 Advanced Hydrology.

FOR 710 Quantitative Forest Genetics Methods.

FOR 711 Tree Improvement Research Techniques.

FOR 712 Forest Economics.

FOR 713 Advanced Topics in Silviculture.

FOR(GN) 725 Forest Genetics.

FOR(GN) 726 Advanced Topics in Quantitative Genetics.

FOR 734 Advanced Forest Management Planning.

FOR 740 Advanced Dendrology.

FOR 742 Current Issues in Natural Resource Policy.

FOR 753 Environmental Remote Sensing.

FOR(ENT) 765 Advanced Forest Entomology.

FOR 772 Forest Management Policies on the Public Lands.

FOR 773 Ecophysiology of Forest Production.

FOR 774 Topics in Forest Modeling.

FOR(SSC) 777 Conservation and Sustainable Development I: Concepts and Methods.

FOR(SSC) 778 Conservation and Sustainable Development II: Integrated Problem Solving.

FOR(SSC) 781 Agroforestry.

FOR(SSC) 782 Silviculture and Management of Forest Plantations in the Tropics.

FOR 783 Tropical Forestry.

FOR 784 The Practice of Environmental Impact Assessment.

FOR(FW) 785 Advanced Wildlife Habitat Management.

FOR 801 Seminar.

FOR 802 Seminar in Wildlife Mnagement.

FOR 803 Seminar in Forest Research.
FOR 810 Special Topics.
FOR 815 Advanced Special Topics.
FOR 885 Doctoral Supervised Teaching.
FOR 890 Doctoral Preliminary Examination.
FOR 893 Doctoral Supervised Research.
FOR 895 Doctoral Dissertation Research.
FOR 899 Doctoral Dissertation Preparation.

Genetics

Degrees Offered: Ph.D., M.S., Master of Genetics

GRADUATE FACULTY

Professor S. E. Curtis, Head of the Department
Box 7614, (919) 515-2291, securtis@ncsu.edu

Distinguished University Professor and William Neal Reynolds Professor: C. S. Levings III

Distinguished University Professor: J. G. Scandalios

William Neal Reynolds Professors: W. R. Atchley, T. F. Mackay

Professors: W. E. Kloos, W. H. McKenzie, H. E. Schaffer, S. L. Spiker;
Adjunct Professor: M.-D. Chilton; *Professors Emeriti:* J. L. Apple, C. H. Bostian, W. D. Hanson, T. J. Mann, D. F. Matzinger, R. H. Moll, C. W. Stuber, A. C. Triantaphyllo; *Associate Professors:* M. T. Andrews, M. A. Conkling, T. H. Emigh, J. W. Mahaffey; *Assistant Professors:* M. D. Purugganan, J. C. Swaffield

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: E. J. Eisen, M. M. Goodman, B. T. McDaniel, R. M. Petters, O. W. Robison, R. R. Sederoff, W. F. Thompson, B. S. Weir, E. A. Wernsman;
Professors Emeriti: J. F. Chaplin, F. L. Haynes Jr., C. L. Markert, L. L. Phillips, J. O. Rawlings; *Associate Professors:* R. S. Boston, L. K. Hanley-Bowdoin, C. H. Opperman; *Research Associate Professor:* S. Zeng

The department provides a well-balanced program of graduate course work and research training. The faculty conducts research in genetics of animals, plants, and bacteria. The student has a choice of research projects in the broad areas of molecular, biochemical, developmental, quantitative and population genetics.

Admission Requirements: Applicants may come from a number of undergraduate programs that include biological, agricultural, physical and mathematical science training. All applications are screened by a departmental committee and the best qualified applicants will be accepted up to the number of spaces that are available for new students.

Master's Degree Requirements: A 9-hour sequence of 3 core courses is required of all majors and minors. A minimum of 2 additional graduate genetics courses are required.

Doctoral Degree Requirements: A 9-hour sequence of 3 core courses is required of all majors and minors. A minimum of 4 additional graduate genetics courses are required.

Student Financial Support: Graduate assistantships and fellowships are available to the students from a number of sources. Information will be provided at the time of application.

Other Relevant Information: New students will rotate through 3 laboratories during their first semester. At the end of the semester, they will choose a laboratory for their research activities consistent with their interests and available research projects. Provisions are available for a co-major and cooperative research in more than one laboratory.

GRADUATE COURSES

GN 504 Human Genetics.

GN 513 Advanced Genetics.

GN 685 Master's Supervised Teaching.

GN 690 Master's Examination.

GN 693 Master's Supervised Research.

GN 695 Master's Thesis Research.

GN 699 Master's Thesis Preparation.

GN 701 Molecular Genetics.

GN 702 Cellular and Developmental Genetics.

GN 703 Population and Quantitative Genetics.

GN(ANS) 708 Genetics of Animal Improvement.

GN 710 Eukaryotic Regulatory Mechanisms.

GN(ANS) 713 Quantitative Genetics and Breeding.

GN(CS) 719 Origin and Evolution of Cultivated Plants.

GN(CS,HS) 720 Molecular Biology in Plant Breeding.

GN(ST) 721 Genetic Data Analysis.

GN(FOR) 725 Forest Genetics.

GN(FOR) 726 Advanced Topics in Quantitative Genetics.
 GN(BO,MB,PP) 730 Fungal Genetics and Physiology.
 GN(ZO) 740 Evolution.
 GN(CS,HS) 741 Plant Breeding Methods.
 GN(CS,HS) 745 Quantitative Genetics in Plant Breeding.
 GN(CS,HS) 746 Breeding Methods.
 GN(CS,HS,PP) 748 Breeding for Pest Resistance.
 GN 750 Developmental Genetics.
 GN 755 Population Genetics.
 GN(ST) 756 Computational Molecular Evolution.
 GN(MB) 758 Prokaryotic Molecular Genetics.
 GN(MB) 760 Experimental Microbial Genetics.
 GN(BCH) 761 Advanced Molecular Biology of the Cell.
 GN(BCH) 768 Nucleic Acids: Structure and Function.
 GN(ST) 770 Statistical Concepts in Genetics.
 GN 793 Special Topics in Genetics.
 GN 801 Seminar.
 GN 809 Colloquium.
 GN 810 Special Topics in Genetics.
 GN 820 Special Problems.
 GN(CS,HS) 860 Plant Breeding Laboratory.
 GN(CS,HS) 861 Plant Breeding Laboratory.
 GN 885 Doctoral Supervised Teaching.
 GN 890 Doctoral Preliminary Examination.
 GN 893 Doctoral Supervised Research.
 GN 895 Doctoral Dissertation Research.
 GN 899 Doctoral Dissertation Preparation.

Graphic Design

Degree Offered: Master of Graphic Design

GRADUATE FACULTY

Associate Professor A. K. Blauvelt, **Head of the Department**
 Box 7701, (919) 515-2202

Professors: M. Davis, R. A. Donaldson, V. M. Foote, H. Khachatoorian, A. S. Lowrey, M. Scotford; **Associate Professors:** K. L. Bailey, A. V. Cooke, J. Spadaro, S. Townsend

Recognizing that graphic design is both a social activity and a form of cultural production, faculty and students in the Department of Graphic Design define the

study of the discipline as necessarily contextual; graduate research examines the creation, reproduction, distribution, and reception of design from a multidisciplinary perspective. The Master of Graphic Design Program also emphasizes the importance of understanding design as the creation of cognitive and cultural artifacts; study focuses on the construction of messages, the reproduction of such artifacts, the systems for their distribution, and their reception within various cultures of society.

Graduate students in graphic design learn through their own search for problems within critical content frameworks presented by the faculty. The program places primary importance on the ability of students to be critical agents; to seek problems and to pose questions. Faculty evaluate graduate students on their capacity to define individual investigations and to support their decision-making with an independent program of reading and research; on their ability to critically evaluate and articulate discoveries; and on their skills in synthesizing ideas through the creation of design artifacts.

The Master of Graphic Design Program provides focused study and research in the discipline that reflects concern for how designers will shape and respond to the changing technological and social communications environments of the future. The Program has the broad objective to educate socially responsible, intellectually curious, historically aware, and technologically adept communication design professionals.

In the Track III Program, students whose undergraduate preparation is in fields other than graphic design examine relationships between their previous study and graphic design. While acquiring design skills and knowledge in graphic design, they apply concepts and methods from their previous study to design research and innovation.

Admissions Requirements: Students must make application to the Department of Graphic Design by January 15. In addition to Graduate School requirements, the department requires department personal data forms and a slide portfolio of design and two-dimensional visual work.

Master's Degree Requirements: Studio credits presented for transfer must be accompanied by a portfolio of work from the courses under consideration.

Student Financial Support: The department has limited provisions for tuition remission and assistantships. Assistantships are awarded on the basis of student and departmental needs. Assistantship applications are available from the Department of Graphic Design and should be submitted with the application for admission (for incoming students) or by the advertised deadline (for continuing students).

GRADUATE COURSES

- GD 501 Graduate Graphic Design Studio I.
- GD 502 Graduate Graphic Design Studio II.
- GD 503 Graduate Graphic Design Studio III.
- GD 517 Advanced Typographic Systems.
- GD 518 Advanced Typographic Expression.
- GD 570 Theory in Practice: Graphic Design since 1945.
- GD 571 Graphic Design as Cognitive Artifact.
- GD 572 Graphic Design as Cultural Artifact.
- GD 573 Graphic Design and New Information Environments.
- GD 580 Special Topics in Graphic Design History.
- GD 581 Graphic Design Final Project Research.
- GD 588 Final Project Studio in Graphic Design.
- GD 592 Special Topics in Graphic Design.
- GD 610 Special Topics in Graphic Design.
- GD 630 Independent Study in Graphic Design.
- GD 676 Special Project in Graphic Design.
- GD 685 Master's Supervised Teaching.
- GD 690 Master's Examination.

Health Occupations Teacher Education

For a listing of graduate faculty and program information, see adult and community college education.

Higher Education Administration

For a listing of graduate faculty and program information, see adult and community college education.

History

Degree Offered: M.A.

GRADUATE FACULTY

Professor J. M. Riddle, Head of the Department

Associate Professor D. A. Zonderman, Director of Graduate Programs

Box 8108, (919) 515-2483

Graduate Alumni Distinguished Professor J. D. Smith, Coordinator, Public History Program

Professors: J. R. Banker, C. H. Carlton, A. J. De Grand, D. P. Gilmartin, W. C. Harris, J. P. Hobbs, A. J. LaVopa, L. O. McMurry, G. W. O'Brien, J. K. Ocko, S. T. Parker, R. H. Sack, R. W. Slatta, J. D. Smith, E. D. Sylla, K. S. Vincent; **Professors Emeriti:** B. F. Beers, M. L. Brown Jr., M. S. Downs, R. W. Greenlaw, D. E. King, M. E. Wheeler, B. W. Wishy; **Associate Professors:** J. E. Crisp, W. A. Jackson III, O. J. Kalinga, W. C. Kimler, K. P. Luria, S. Middleton, J. A. Mulholland, S. L. Spencer, G. D. Surh, P. Tyler, K. P. Vickery; **Adjunct Associate Professors:** J. J. Crow, D. J. Olson; **Associate Professor Emeritus:** R. N. Elliott; **Assistant Professors:** H. Brewer, A. F. Khater, A. W. Mitchell; **Visiting Assistant Professor:** J. C. Bonham; **Adjunct Assistant Professors:** V. L. Berger, J. W. Caddell, J. C. Cashion, H. E. Mattox, W. S. Price Jr., G. E. Southern

ASSOCIATE MEMBER OF THE PROGRAM

Associate Professor: R. B. Mullin

Admission Requirements: In the required career goals statement, the major country, topic and historical period of interest should be included. Students admitted provisionally must complete at least 9 hours of graduate courses making grades of A or B to be considered for full graduate standing.

Master's Degree Requirements: Master of Arts Degree in History: This program requires at least twenty-four hours of course work and a thesis. Each student's program is tailored to enhance his or her career objectives. Social studies teachers, for example, are awarded a G certificate on completion of the M.A. in history with a minor in education. Similarly, students who plan to pursue a Ph.D. degree receive the requisite training and assistance. **Master of Arts Degree in Public History:** This non-thesis program requires thirty-six hours of course work. Half the hours fall in historical studies, the rest in applied history classes, including innovative courses in iconographic materials and archival conservation, documentary editing, and historic preservation. Students may select a practicum that places them under the direct supervision of the State Archivist of North Carolina. Students may select another practicum in their own special area of interest—including historic site administration, museology, historic preservation, or historical publications.

Student Financial Support: Graduate assistantships and fellowships are available to students in both programs and are awarded by open competition.

Other Relevant Information: Application deadline is January 15; students are admitted for the fall semester only. The general portion of the GRE is required for those seeking admission to both the history and public history programs. No subject test is required for either program.

GRADUATE COURSES

- HI 500 Civilizations of the Ancient Near East.
- HI 504 Rome to 337 A.D.
- HI 505 History and Archaeology of the Roman Empire.
- HI 506 From Roman Empire to Middle Ages.
- HI 507 Islamic History to 1798.
- HI 509 The High Middle Ages.
- HI 510 Italian Renaissance.
- HI 511 The Protestant and Catholic Reformation of the 16th Century.
- HI 514 France in the Old Regime.
- HI 515 Revolutionary Europe.
- HI 518 Fascist Italy and Nazi Germany.
- HI 519 Modern European Imperialism.
- HI 520 European Diplomatic History.
- HI 521 European Intellectual History: The Eighteenth Century.
- HI 522 European Intellectual History: The 19th Century.
- HI 525 Tudor and Stuart England.
- HI 529 20th Century Britain.
- HI 530 Modern France.
- HI 531 Germany: Luther to Bismarck 1500-1871.
- HI 532 History of Germany Since 1871.
- HI 538 The Russian Empire to 1917.
- HI 539 History of the Soviet Union and After.
- HI 541 Colonial and Revolutionary U. S.
- HI 543 U. S. Constitutional History.
- HI 546 Civil War and Reconstruction.
- HI 547 History of American Women to 1900.
- HI 548 American Women in the Twentieth Century.
- HI 549 U. S. Labor to 1900.
- HI 550 U. S. Labor Since 1900.
- HI 552 Recent America.
- HI 553 U. S.-Latin American Relations Since 1823.
- HI 554 History of U. S. Foreign Relations, 1900-Present.
- HI 555 History of the Civil Rights Movement.
- HI 556 Early American Thought.
- HI 557 Twentieth-century U. S. Intellectual History.
- HI 558 Modern American Historical Biography.
- HI(REL) 560 American Religion after Darwin.
- HI 561 Civilization of the Old South.
- HI 562 Social History of the New South.

- HI 564 Topics in the History of North Carolina.
- HI 569 Latin American Revolutions in the Twentieth Century.
- HI 571 Revolutionary China.
- HI 575 History of the Republic of South Africa.
- HI 576 Leadership in Modern Africa.
- HI 579 Africa (Sub-Saharan) in the Twentieth Century.
- HI 580 Scientific Revolution: 1300-1700.
- HI 581 History of Life Sciences.
- HI 582 Darwinism in Science and Society.
- HI 586 History and Principles of the Administration of Archives and Manuscripts.
- HI 587 Application of Principles of Administration of Archives and Manuscripts.
- HI 588 Conservation of Archival and Library Materials.
- HI 589 Automation and Public History.
- HI 590 Documentary Editing and Historical Publication.
- HI 591 Introduction to Museology.
- HI 592 Advanced Museology.
- HI 593 Material Culture.
- HI 596 Introduction to Public History.
- HI 597 Historiography and Historical Method.
- HI 598 Historical Writing.
- HI 599 Independent Study.
- HI 642 Practicum in Public History.
- HI 685 Master's Supervised Teaching.
- HI 690 Master's Examination.
- HI 693 Master's Supervised Research.
- HI 695 Master's Thesis Research.
- HI 699 Master's Thesis Preparation.

Horticultural Science

Degrees Offered: Ph.D., M.S., Master of Horticultural Science

GRADUATE FACULTY

Professor T.J. Monaco, Head of the Department

Professor S. L. Warren, Director of Graduate Programs

Box 7609, (919) 515-1193, stu_warren@ncsu.edu

Graduate Alumni Distinguished Professor: D. M. Pharr

Professors: D. A. Bailey, J. R. Ballington Jr., T. E. Bilderback, S. M. Blankenship, F. A. Blazich, A. A. De Hertogh, P. R. Fantz, W. C. Fonteno, R. G. Gardner, L. E. Hinesley, W. E. Hooker, D. W. Monks, P. V. Nelson, M. M. Peet, K. B. Perry, E. B. Poling, M. A. Powell, D. C. Sanders, C. R. Unrath, T. C. Wehner, D. J. Werner, L. G. Wilson; **Adjunct Professors:** W. W. Collins, P. S. Zorner; **Professors Emeriti:** W. E. Ballinger, F. D. Cochran, F. L. Haynes Jr., W. R. Henderson, J. M. Jenkins, T. R. Konsler, R. A. Larson, J. W. Love, C. M. Mainland, C. H. Miller, D. T. Pope, W. A. Skroch; **Associate Professors:** S. D. Clouse, J. M. Davis, J. C. Neal, M. L. Parker, T. G. Ranney, J. R. Schultheis; **Associate Professors Emeriti:** T. F. Cannon, D. C. Zeiger; **Assistant Professors:** N. G. Creamer, G. E. Fernandez, A. R. Okigbo, B. E. Whipker; **Research Assistant Professor:** J. D. Williamson; **Visiting Assistant Professor:** G. C. Yencho; **Adjunct Assistant Professor:** F. C. Wise; **Lecturer:** M. E. Traer

ASSOCIATE MEMBERS OF THE PROGRAM

Professor: G. E. Hoyt; **Assistant Professor:** F. H. Yelverton

Course offerings or research facilities are available in the following areas: plant physiology, breeding and genetics, herbicide physiology, nutrition, propagation, tissue culture, biotechnology, growth regulators, postharvest physiology, control of environment, agricultural meteorology, Christmas tree research, landscape horticulture and biochemistry of varietal differences.

Admission Requirements: At the discretion of a graduate program, a student may be admitted provisionally for graduate study in a program without the GRE scores. To be admitted, a student should have completed course work in physics, mathematics, chemistry, soils, plant pathology, genetics, entomology and several courses in horticulture. An applicant deficient in course work may be admitted on a provisional basis until the deficiency is made up.

Master's Degree Requirements: For the Master of Science degree, the program must include 4 credit hours of the horticultural science core courses, seminar preparation, and presentation of one seminar, and teaching and outreach experiences.

Doctoral Degree Requirements: The program must include three credit hours of the horticultural science core courses, seminar preparation, presentation of two seminars, and teaching and outreach experiences. The preliminary comprehensive examination consists of written and oral examinations. The Ph.D. requires research and a thesis which is defended orally during the final examination.

Student Financial Support: The department has a number of graduate teaching and research assistantships available for promising students; these include Agricultural Foundation and Experiment Station assistantships. Those interested should apply at least 9 months prior to their anticipated enrollment date.

GRADUATE COURSES

HS(PP,CS) 502 Plant Disease: Methods and Diagnosis.
HS 525 Advanced Plant Propagation.
HS 590 Special Problems in Horticultural Science.
HS 610 Special Topics.
HS 615 Advanced Special Topics.
HS 685 Master's Supervised Teaching.
HS 690 Master's Examination.
HS 691 Research Principles.
HS 693 Master's Supervised Research.
HS 695 Master's Thesis Research.
HS 699 Master's Thesis Preparation.
HS 701 Carbohydrate Metabolism and Transport.
HS 703 Breeding Asexually Propagated Crops.
HS 704 Plant Nomenclature.
HS 705 Physiology of Flowering.
HS 706 Fruit Development and Postharvest Physiology.
HS 707 Environmental Stress Physiology.
HS(CS) 715 Weed Science Research Techniques.
HS(CS) 716 Weed Biology.
HS(CS) 717 Weed Management Systems.
HS(CS) 718 Biological Control of Weeds.
HS(CS,GN) 720 Molecular Biology in Plant Breeding.
HS 722 Mineral Nutrition in Plants.
HS(CS,SSC) 725 Herbicide Chemistry.
HS(CS,SSC) 727 Herbicide Behavior in Soil and Water.
HS(CS) 729 Herbicide Behavior in Plants.
HS 731 Physiology of Landscape Plants.
HS 732 Vegetable Crop Physiology.
HS 734 Vegetable Crops Practicum.
HS(CS,GN) 741 Plant Breeding Methods.
HS(CS,GN) 745 Quantitative Genetics in Plant Breeding.
HS(CS,GN) 746 Breeding Methods.
HS(CS,GN,PP) 748 Breeding for Pest Resistance.
HS 790 Special Problems in Horticultural Science.
HS 801 Seminar.

HS 815 Advanced Topics.
HS(CS,GN) 860 Plant Breeding Laboratory.
HS(CS,GN) 861 Plant Breeding Laboratory.
HS 885 Doctoral Supervised Teaching.
HS 890 Doctoral Preliminary Examination.
HS 891 Research Principles.
HS 893 Doctoral Supervised Research.
HS 895 Doctoral Dissertation Research.
HS 899 Doctoral Dissertation Preparation.

Immunology

Degrees Offered: Ph.D., M.S., Master of Immunology

GRADUATE FACULTY

Professor W. A. Tompkins, *Director*

Box 8401, (919) 515-7394, wayne_tompkins@ncsu.edu

Professors: P. F. Agris, G. W. Almond, E. B. Breitschwerdt, T. T. Brown Jr., P. B. Carter, E. V. De Buysscher, F. W. Edens, B. Hammerberg, M. G. Levy, E. J. Noga, M. A. Qureshi, M. B. Tompkins; *Research Professor:* E. A. Havell; *Professors Emeriti:* L. Coggins, J. G. Lecce; *Associate Professors:* S. M. Laster, B. Sherry, S. L. Tonkonogy; *Research Associate Professor:* B. A. Weeks-Perkins; *Visiting Research Associate Professor:* S. Kennedy-Stoskopf; *Assistant Professors:* T. B. Kepler, T. Olivry; *Visiting Assistant Professor:* R. V. English

Course offerings or research facilities are available in the following areas: immunogenetics, immunopathology, immunotoxicology, immunoparasitology, mucosal immunology, molecular and infectious disease immunology, molecular genetics, aquatic immunology and environmental immunology.

Admission Requirements: Students will be accepted into the immunology program based on their academic records (GPA) as undergraduates and/or as veterinary or medical students, results of the GRE, letters of recommendation and expression of interest in immunology. For the Ph.D. program, special consideration will be given to students who have had research experience (either an M.S. degree or other laboratory experience), especially in immunology, microbiology, biochemistry, or genetics or students are completing strong clinical residency programs. Completed applications should be received by February 1 for fall admission.

To be admitted, a student should be a graduate of a major accredited biological science or medical science program. Students lacking appropriate courses may be considered for admission but will be required to make up certain undergraduate deficiencies without graduate credit.

Master's Degree Requirements: Courses must include at least two 700-800-level immunology courses and one 700-800-level core biochemistry course.

Doctoral Degree Requirements: Generally, Ph.D. students should take 22 credit hours to satisfy the course requirements of the program. These include at least two 700-800-level immunology courses, one 700-800-level biochemistry course and the core course in biotechnology (BIT 860). Additional courses in the biotechnology series are recommended. The remaining credit hours (8-10) should include journal club (IMM 816), seminar (IMM 807) and research credits.

Student Financial Support: Graduate assistantships are available to students in the immunology program through the affiliated departments and graduate training grants. In addition, there are graduate research assistantships provided by individual faculty of the program.

Other Relevant Information: The immunology program is an interdepartmental graduate program with faculty drawn from the College of Veterinary Medicine and the College of Agriculture and Life Sciences' Departments of Biochemistry, Microbiology and Poultry Science. For administrative purposes, all students accepted into the program will also have to be student members of one of the participating departments.

GRADUATE COURSES

IMM 685 Master's Supervised Teaching.

IMM 690 Master's Examination.

IMM 693 Master's Supervised Research.

IMM 695 Master's Thesis Research.

IMM 699 Master's Thesis Preparation.

IMM(TOX) 705 Immunotoxicology.

IMM(MB) 751 Immunology.

IMM(CBS) 755 Immunoparasitology.

IMM(CBS,MB,PHY,PO) 756 Immunogenetics.

IMM(PO) 757 Avian Immunology.

IMM(CBS,MB) 783 Advanced Immunology.

IMM(CBS) 807 Seminar in Veterinary Microbiology/ Immunology.

IMM(CBS) 816 Advanced Topics in Immunology and Biotechnology.

IMM 885 Doctoral Supervised Teaching.

IMM 893 Doctoral Supervised Research.
IMM 895 Doctoral Dissertation Research.
IMM 899 Doctoral Dissertation Preparation.

Industrial Design

Degree Offered: Master of Industrial Design

GRADUATE FACULTY

Assistant Professor P. R. Hooper, *Head of the Department*

Professor H. Khachatoorian, *Director of Graduate Programs*

Box 7701, (919) 515-8322

Professors: V. M. Foote, C. E. Joyner, G. B. Lewis, M. Pause; *Associate*

Professors: A. V. Cooke, C. D. Cox, L. M. Diaz, B. W. Laffitte, D. G. Raymond,

S. M. Toplikar; *Assistant Professor:* P. Fitzgerald

Industrial Design is the professional service of creating and developing concepts and specifications that optimize the value, function and appearance of products and product systems to the mutual benefit of both user and manufacturer. This service is often provided in the context of a cooperative working relationship with other members of a development group.

Typical groups include management, marketing, engineering and manufacturing specialists. Industrial designers place special emphasis on human characteristics, needs and interests. These require particular understanding of visual, tactile, safety and convenience criteria. Industrial designers combine these considerations with practical concern for technical processes and requirements for manufacture; marketing opportunities and economic constraints; and distribution, sales and servicing arrangements. Industrial designers are guided by the awareness of their obligations to protect and promote public safety and well being; to respect the environment; and to observe ethical business practices.

Graduates with a Master of Industrial Design have career opportunities in four general areas; corporate design offices in manufacturing companies, independent design consulting firms, governmental agencies and educational institutions.

Admissions Requirements: Applicants will be considered for admission on an individual basis and plans of study will be developed to take into account previous academic and professional experiences. In addition to other forms, applications must include a departmental personal data forms and a portfolio (required of students with design backgrounds).

Student Financial Support: Priority is given to students in the major science, social science and technology areas.

GRADUATE COURSES

ID 500 Advanced Industrial Design (Series).
ID 511 Industrial Design Materials and Processes I.
ID 512 Industrial Design Materials and Processes II.
ID 532 Advanced Concepts in Product Engineering.
ID 570 Advanced Industrial Design - Textiles (Series).
ID 581 Industrial Design Project Preparation.
ID 582 Special Topics in Industrial Design.
ID 588 Final Project Studio in Industrial Design.
ID 602 Special Seminar.
ID 630 Independent Study.
ID 676 Special Project.
ID 685 Master's Supervised Teaching.
ID 690 Master's Examination.

Industrial Engineering

Degrees Offered: Ph.D, M.S., Master of Industrial Engineering

GRADUATE FACULTY

Professor S. D. Roberts, *Head of the Department*
Professor J. R. Wilson, *Director of Graduate Programs*
Box 7906, (919) 515-6415, jwilson@eos.ncsu.edu

University Professor: S. E. Elmaghraby

Professors: M. A. Ayoub, R. H. Bernhard, C. T. Culbreth Jr., S.-C Fang, T. J. Hodgson, M. G. Kay, R. E. King, W. L. Meier Jr., G. A. Mirka, H. L. Nuttle, R. G. Pearson, W. J. Rasdorf, S. D. Roberts, W. A. Smith Jr.; ***Professors Emeriti:*** R. Alvarez, C. A. Anderson, J. R. Canada, R. W. Llewellyn, A. L. Prak; ***Associate Professors:*** Y. Fathi, E. T. Sani, R. E. Young; ***Assistant Professors:*** D. R. Cormier, H. Damerджи, Y. Lee, C. M. Sommerich, J. B. Taylor, J. Trevino; ***Adjunct Assistant Professor:*** S. D. Moon

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: T. Johnson, R. Luo; ***Associate Professors:*** T. L. Honeycutt, R. D. Rodman

The graduate faculty in industrial engineering supports academic and research interests in four areas: manufacturing systems (manufacturing processes, CAM, CIM, robotics, automation, and concurrent engineering); production systems (planning, scheduling, routing, inventory control, materials handling, facility design, and quality control); systems analysis and optimization (stochastic processes, simulation, and modeling); and ergonomics (human performance, occupational safety, and biomechanics). The department faculty actively supports independent graduate degree programs in operations research, integrated manufacturing systems engineering and management.

Admission Requirements: Applications are accepted from undergraduate majors in engineering and in the behavioral, physical, and mathematical sciences who meet prerequisites in calculus and matrix/linear algebra, computer science, and statistics.

Master's Degree Requirements: The M.S. degree involves depth of study in a specified area of concentration, nine hours in a minor and six hours of research credit. The Master of Industrial Engineering (M.IE.) degree may be obtained by course work only; project work is optional. A minimum of 33 hours is required for the M.IE.

Doctoral Degree Requirements: This degree requires 60 hours of course work beyond the bachelor's degree. Undergraduate students with superior credentials may apply directly to the doctoral program and bypass the master's degree. For students who have completed the master's degree, typically 30 to 36 hours of additional course work are required. A departmental written qualifying examination in two areas is required.

Student Financial Support: Research and teaching assistantships are available on a competitive basis to early applicants. Fellowships of \$3,000 and \$6,000 which supplement assistantship stipends, are available to U.S. applicants with superior credentials. Award priority is given to Ph.D. then M.S. applicants. The department does not make assistantship awards to foreign applicants.

GRADUATE COURSES

IE(MA,OR) 505 Linear Programming.

IE 510 Applied Engineering Economy.

IE 518 Manufacturing Operations Management.

IE(CSC) 546 Management Decision and Control Systems.

IE(CSC) 556 Voice Input/Output Communication Systems.

IE 589 Special Topics in Industrial Engineering.

IE 601 Seminar.

IE 610 Special Topics in Industrial Engineering.
 IE 637 Directed Study in Industrial Engineering.
 IE 639 Advanced Directed Study in Industrial Engineering.
 IE 677 Industrial Engineering Projects.
 IE 685 Master's Supervised Teaching.
 IE 693 Master's Supervised Research.
 IE 695 Master's Thesis Research.
 IE 696 Research Practicum in Occupational Biomechanics.
 IE 699 Master's Thesis Preparation.
 IE 706 Design of Flexible Manufacturing Systems.
 IE 707 Real-time Control of Automated Manufacturing.
 IE(OR) 709 Dynamic Programming.
 IE 711 Capital Investment Economic Analysis.
 IE 712 Bayesian Decision Analysis for Engineers and Managers.
 IE 714 Product Engineering.
 IE 715 Process Engineering.
 IE 716 Computer-aided Manufacturing.
 IE 717 Computerized Process Planning.
 IE 719 CIM System Design.
 IE(MAE) 720 Industrial Robotics.
 IE 721 Advanced Problems in Management Systems Engineering.
 IE 723 Production Planning, Scheduling and Inventory Control.
 IE 725 Organizational Planning and Control.
 IE 731 Multi-attribute Decision Analysis.
 IE 736 Computer Integration of Manufacturing Systems.
 IE(PSY) 740 Human Factors in Systems Design.
 IE 741 Occupational Safety Engineering.
 IE 742 Environmental Stress, Physiology and Performance.
 IE(PSY) 743 Ergonomic Performance Assessment.
 IE(PSY) 744 Human Information Processing.
 IE(PSY) 745 Human Performance.
 IE 748 Quality Engineering.
 IE 749 Tolerances in Design and Manufacturing.
 IE 748 Quality Engineering.
 IE 750 Concurrent Engineering.
 IE 751 Modeling Precision in Design and Manufacturing.
 IE 753 Material Handling Systems.
 IE 754 Facility Layout and Location.
 IE 755 The Just-in-time Production System.
 IE(CSC,ECE) 756 Advances in Voice Input/Output Communications Systems.
 IE 759 Constraint Modeling of Manufacturing Systems.
 IE 760 Applied Stochastic Models in Industrial Engineering.
 IE(OR) 761 Queues and Stochastic Service Systems.

IE(CSC,OR) 762 Computer Simulation Techniques.
 IE 764 Occupational Biomechanics.
 IE 765 Musculoskeletal Mechanics.
 IE(MA,OR) 766 Network Flows.
 IE 767 Upper Extremity Biomechanics.
 IE 768 Spine Biomechanics.
 IE(OR) 772 Stochastic Simulation Design and Analysis.
 IE 789 Advanced Special Topics in Industrial Engineering.
 IE 790 Advanced Special Topics in Systems Analysis and Optimization.
 IE 791 Advanced Special Topics in Manufacturing.
 IE 793 Advanced Special Topics in Production.
 IE 794 Advanced Problems in Ergonomics.
 IE 796 Research Practicum in Occupational Biomechanics.
 IE 801 Seminar.
 IE(PSY) 802 Area Seminar in Ergonomics.
 IE 803 Seminar in Product Safety and Liability.
 IE 804 Seminar in Applied Ergonomics.
 IE(MA,OR) 812 Special Topics in Mathematical Programming.
 IE 815 Advanced Special Topics in Industrial Engineering.
 IE 816 Advanced Special Topics in Systems Analysis and Optimization.
 IE 817 Advanced Special Topics in Manufacturing.
 IE 818 Advanced Special Topics in Production.
 IE 837 Directed Study in Industrial Engineering.
 IE 839 Advanced Directed Study in Industrial Engineering.
 IE 861 Production Systems.
 IE(OR) 862 Scheduling and Routing.
 IE 877 Industrial Engineering Projects.
 IE 885 Doctoral Supervised Teaching.
 IE 890 Doctoral Preliminary Examination.
 IE 893 Doctoral Supervised Research.
 IE 895 Doctoral Dissertation Research.
 IE 899 Doctoral Dissertation Preparation.

Instructional Technology - Computers

For a listing of graduate faculty and program information, see curriculum and instruction.

Integrated Manufacturing Systems Engineering

Degree Offered: Master of Integrated Manufacturing System Engineering

GRADUATE FACULTY

Professor A. E. Bayoumi, *Associate Director for Academic Programs*

Box 7915, (919) 515-3808, Fax: (919) 515-1675, bayoumi@eos.ncsu.edu

IMSE World-Wide Web Home Page: <http://www.imse.ncsu.edu>

Professors: R. L. Barker, T. G. Clapp, C. T. Culbreth Jr., P. L. Grady, T. J. Hodgson, T. Johnson, R. E. King, R. Luo, C. J. Maday, W. L. Meier Jr., H. L. Nuttle, S. D. Roberts, W. A. Smith Jr., K. Tai, J. R. Wilson, S. C. Winchester Jr., C. F. Zorowski; **Associate Professors:** D. R. Bahler, M. D. Boyette, Y. A. Chen, Y. Fathi, T. K. Ghosh, G. L. Hodge, J. W. Leach, P. I. H. Ro, R. D. Rodman, J. P. Roise, J. P. Rust, E. T. Sanii, A. M. Seyam, R. E. Young; **Adjunct Associate Professor:** J. Taheri; **Assistant Professors:** D. R. Cormier, H. Damerdjii, M. G. Kay, Y. Lee, G. A. Mirka, M. K. Ramasubramanian, C. M. Sommerich, J. B. Taylor; **Adjunct Assistant Professor:** J. Trevino; **Lecturer:** J. C. Sutton III

The Integrated Manufacturing Systems Engineering Institute (IMSEI), established in 1984, provides multidisciplinary graduate level education and practical training opportunities in the theory and practice of integrated manufacturing systems engineering at the master's degree level. IMSEI focuses on providing a manufacturing presence and a program environment in the College of Engineering where faculty, graduate students and industry can engage cooperatively in multidisciplinary graduate education, basic and applied research, and technology transfer in areas of common interest related to modern manufacturing systems technology. The objective of the IMSE program is to take a student with traditional discipline background in engineering or the physical sciences and broaden the student's understanding of the multidisciplinary area of manufacturing systems. Particular emphasis is placed on computer integration and application in manufacturing.

Admission Requirements: Admission to the IMSE master's program requires a B.S. degree from an accredited institution preferably in engineering or in physics, mathematics or computer science.

Master's Degree Requirements: This degree requires a minimum of 27 hours of graduate course work and 6 hours of research project. Five core courses, required of all students, present a multidisciplinary overview of subject materials basic to manufacturing systems. Specialization is provided in the student's plan of graduate

work through the selection of a minimum of four electives in a specified area of concentration. The six hours of required individual or team research project are intended to complement and reinforce the area of concentration.

Student Financial Support: Assistantships, fellowships and internships are available to qualified students. Full financial support package includes payments for tuition and fees and health insurance coverage.

Fellowship/Internship: The IMSEI internship program has been established to provide a cooperative industrial and academic experience for some IMSEI students and industrial sponsors. Several Fellowship/Internships awards are made available every year for special training in IMSEI member companies. Students who are selected to participate in the internship program will receive financial support for four semesters and one summer. Typically, the student will attend classes for two semesters (fall and spring), work at the sponsor company for the following summer and fall semester, and complete the IMSEI program the following spring semester. The student will use some aspect of the experience at the sponsor company as the basis of the required IMSEI project.

Other Relevant Information: The Institute is supported by an industrial affiliates group of member companies. They have included AT&T, CP&L, Dupont, Ford Motor, GE, IBM, John Deere, Nortel, R. J. Reynolds Tobacco and Westinghouse. The Institute interacts with member companies through an Industry Advisory Board and a Technical Monitors Group.

Core Courses (1 required from each category for a total of 15 credit hours required)

- | | |
|--------------------|--|
| Category 1: | CSC 510 Software Engineering
CSC 742 Database Management
IE(CSC) 762 Computer Simulation Techniques |
| Category 2: | IE 711 Capital Investment Economic Analysis
BUS 521 Managerial Finance |
| Category 3: | IE 716 Computer-aided Manufacturing
<i>Or</i>
IE 714 Product Engineering
<i>And</i>
IE 715 Precision Manufacturing |
| Category 4: | IE 723 Production Planning, Scheduling and Inventory Control |
| Category 5: | MAE 742, Mechanical Design for Automated Assembly
MAE 534 Mechatronics Design |

GRADUATE COURSES

IMS 676 Manufacturing Systems Engineering Project.

IMS 685 Master's Supervised Teaching.

IMS 690 Master's Examination.

International Studies

Degree Offered: Master of International Studies

GRADUATE FACULTY

Professor M. S. Soroos, *Director of Graduate Programs*

Box 8102, (919) 515-3755, Fax (919) 515-7333, soroos@ncsu.edu

Professors: S. W. Buol, L. S. Bull, C. H. Carlton, F. W. Cubbage, D. A. Daley, E. W. Erickson, R. L. Moxley, J. K. Ocko, R. P. Patterson, L. R. Schehr, M. D. Schulman, J. C. H. Shih, F. J. Smith, M. A. Witt; **Associate Professors:** J. C. Dutton, C. E. Griffin, R. C. Kochersberger, R. J. Moog, M. A. Renko, A. L. Schiller, R. J. Thomson, J. M. Wallace III; **Assistant Professors:** M. A. Johnson, A. W. Mitchell, R. F. Stephen, S. T. Warren

The Master of International Studies (MIS), formerly the Master of Technology for International Development, is a 36-hour, non-thesis program which prepares students for careers in government service, international institutions, international businesses and nongovernmental organizations. While the degree is administered by the Department of Political Science and Public Administration, the MIS is a multi-disciplinary degree program with a faculty and curriculum which spans numerous colleges and several departments. Approximately half of the course work for the degree is devoted to developing international knowledge and competencies. The remaining half is taken up largely by individualized regional, topical, professional or technical specializations designed by students in consultation with their faculty advisors.

Admission Requirements: Applicants must provide GRE scores in addition to other application materials required by the Graduate School.

Degree Requirements: The requirements for the MIS degree are as follows:

1. 36 credit hours or course work;
2. One course from each of the following groupings:

Group A - International Relations

PS 530 Seminar in International Relations

PS 533 Global Problems and Policies

III 554 History of U.S. Foreign Relations

Group B - Comparative Politics/Societies

PS 540 Seminar in Comparative Politics

PS 545 Comparative Systems of Law and Justice

SOC 726 Developing Societies

SOC 727 Comparative Societies

Group C - International Law and Organization

PS 531 International Law and Organization

PS 536 Global Environmental Law and Policy

Group D - International Economy/Development

BUS 426 International Financial Management

EC 448 International Economics

ECG 540 Economic Development

PS 539 International Political Economy

Group E - Cross-cultural Communication

BUS 502 Global and Cultural Environment in Management

COM 462 Cross-cultural Communication

PSY 755 Cross-cultural Research and Development

3. An individualized specialization of 12-15 hours. The specialization may be in a *geographical region* (e.g., Europe), an *international topic* (e.g., environment and sustainable development), a *professional field* (e.g., public administration) or a *technical speciality* (e.g., agriculture). The specialization should include an appropriate research methodology course, if recommended by the chair of the student's faculty advisory;
4. Capstone writing seminar (3 hours);
5. A significant foreign work or study experience of at least twelve weeks;
6. Reading/listening/speaking competency in a foreign language;
7. A comprehensive oral examination.

GRADUATE COURSES

TID 501 Colloquium in International Development.

TID 630 Independent Study.

TID 683 Master's Supervised Teaching.

TID 690 Master's Examination.

Landscape Architecture

Degree Offered: Master of Landscape Architecture

GRADUATE FACULTY

Professor A. R. Rice, Head of the Department

Associate Professor F. H. Magallanes, Director of Graduate Programs

Box 7701, (919) 515-8340

Professors: A. R. Abbate, R. C. Moore, R. R. Wilkinson, D. Wood; *Professor*

Emeritus: R. E. Stipe; *Associate Professor:* S. R. Raval; *Research Associate*

Professor: J. E. Fels; *Adjunct Associate Professor:* C. E. Roe; *Assistant*

Professor: J. D. Tomlinson

ASSOCIATE MEMBER OF THE PROGRAM

Professor: W. E. Hooker; *Lecturer:* M. E. Traer

Course offerings or research facilities are available in the following areas: site planning and design, urban public spaces, community design, regional design, resource management and specialized landscapes.

Admission Requirements: The best-qualified applicants will be accepted up to the number of spaces that are available for new students. Exceptions to the minimum 3.00 GPA may be made for students with special backgrounds, abilities and interests.

Master's Degree Requirements: *I. Accredited First Professional Degree in Landscape Architecture:* Candidates follow a 72-hour sequence of courses over a six-semester period. Three semesters of the program of study are determined by the required curriculum. The last three semesters of study are outlined by the student, Director of Graduate Programs and/or advisor. A final project with an investigative direction is set in collaboration with a committee of faculty. A formal presentation of findings to the faculty, student body and local professionals is required. The summary report must be submitted to the School of Design faculty to meet the graduation requirements. *II. Advanced Studies in Landscape Architecture:* Candidates with an accredited undergraduate degree follow a 48-hour sequence of courses. Twenty-seven hours of electives are chosen through advising with the Director of Graduate Programs, advisors and faculty committee. Similar requirements for a final project, presentation and summary report apply.

Other Relevant Information: Students have the option of including a graduate minor in their course of studies. Minors can be in any other graduate program offered at NC State. Some examples of graduate minors are: architecture, education, horticultural science, civil engineering, and parks, recreation and tourism management. Special programs and labs in the Department of Landscape Architecture and the School of Design include the Center for Universal Design and the Design Research Laboratory and in international courses and design studios in Italy, India and Spain.

GRADUATE COURSES

- LAR 500 Landscape Design Studio.**
- LAR 510 Graphics for Landscape Architects.**
- LAR 511 Community Design Policy.**
- LAR 512 Landscape Resource Management.**
- LAR 513 Social Factors Analysis in Site Planning.**
- LAR 515 Advanced Community Design and Development Control.**
- LAR 521 Values, Theory and Methods of Landscape Architecture.**
- LAR 530 Advanced Site Planning.**
- LAR 533 Plants and Design.**
- LAR 551 Ethics of Professional Practice in Landscape Architecture.**
- LAR 564 Management and Marketing Techniques in Community Design.**
- LAR 573 Historic Preservation.**
- LAR 574 Landscape and Townscape Conservation.**
- LAR 575 Development Planning.**
- LAR 576 Master Planning and Design Management.**
- LAR 582 Special Topics in Landscape Architecture.**
- LAR 630 Independent Study.**
- LAR 679 Final Studio Project.**
- LAR 685 Master's Supervised Teaching.**
- LAR 690 Master's Examination.**
- LAR 697 Final Research Project.**

Liberal Studies

Degree Offered: M.A.

GRADUATE FACULTY

Professor C. D. Korte, Director of Graduate Programs
Box 7107, (919) 515-2479

The Master of Arts in Liberal Studies (MALS) program is an interdisciplinary graduate program which is administered by the Division of Multidisciplinary Studies

and offered by the College of Humanities and Social Sciences. This is a broad, interdisciplinary program of part-time graduate study that integrates and expands awareness and that is geared to the student's personal interests. Each student, in consultation with an academic advisor, designs an individual program of study around an interdisciplinary theme or topic that is of intrinsic interest to the student or that relates to the student's professional or vocational interests. Students take graduate courses across a range of NC State departments as well as MALS seminars designed specifically for the program.

Admissions Requirements: Students entering the master's program in liberal studies must have an undergraduate degree. In addition to the material required by the Graduate School, students applying are asked to submit a statement describing their objectives in doing a degree in liberal studies and a writing sample. GRE scores are not required. All applicants are interviewed.

Master's Degree Requirements: Thirty hours of course work made up of (1) a minimum of three MALS seminars, (2) eighteen hours representing the student's interdisciplinary theme or concentration, and (3) a three-hour culminating project. Examples of concentrations that are well supported by graduate courses in the NC State curriculum are: science, technology and society; the American experience; and leadership

GRADUATE COURSE

MLS 501 Seminar in Liberal Studies.

MLS 630 Independent Study.

MLS 676 Independent Project.

MLS 690 Master's Examination.

Management

Degree Offered: M.S.

GRADUATE FACULTY

Professor S. G. Allen, Director of Graduate Programs

Box 7229, (919) 515-5584, msm@ncsu.edu

Professors: S. H. Barr, R. P. Burns, R. L. Clark, G. W. Dickson, D. M. Holthausen, C. P. Jones, R. J. Lewis, S. E. Margolis, S. G. Pantula, D. K. Pearce, S. D. Roberts, S. C. Winchester Jr.; **Associate Professors:** R. C. Abt, A. Agrawal, D. L. Baumer, C. C. Bozarth, S. N. Chapman, Y. A. Chen, J. C. Dutton Jr., S. K. Markham, E. A. McDermed, K. Mitchell, A. Padilla, J. C. Poindexter Jr.;

Assistant Professors: L. Aiman-Smith, K. S. Davis, J. K. McCreery, M. Montoya-Weiss, P. W. Mulvey, D. P. Pagach, K. D. Schenk, G. B. Voss, G. S. Young

Since its inception in 1976, the Master of Science in Management (MSM) program has taken a distinctive, innovative approach to management education. The MSM focuses on aspects of management that have traditionally been neglected in business schools, especially the management of information, production and technology. A new integrative curriculum introduced in fall 1995 emphasizes business processes, such as new product development, rather than traditional organizational functions, such as marketing or finance.

Students begin the program with a course that provides an overview of critical business processes, an introduction to business strategy, and initial training in individual and group effectiveness. The integrated nature of the program is maintained through lab sessions that approach management problems using tools from a wide range of courses, along with capstone courses in strategy and implementation. In their last semester, all students must complete a practicum where they work on a management issue in a real organization.

Another distinctive aspect of the MSM program is the integration of advanced courses in technology and management-related topics in other colleges at NC State into its curriculum. MSM students take courses in industrial engineering, statistics, computer science and natural resources to give them skills and knowledge not generally available in most business schools. In addition, many students in other colleges at NC State take minors in management.

MSM Curriculum: The MSM curriculum requires that every student complete the core curriculum listed below, along with courses in a technical concentration, for a total of 45 credit hours. Students also must complete a series of integrated management labs.

Management Environment

BUS 501 Legal and Regulatory Environment of Management
BUS 502 Global and Cultural Environment of Management
ECG 507 Microeconomics and the Business Environment
ECG 508 Macroeconomics and the Business Environment

Management Skills in an Integrative Context

BUS 531 Managerial Processes and Effectiveness
BUS 533 Leadership in Management
BUS 581 Long-range Analysis and Strategy

Management Functions

BUS 521 Managerial Finance

BUS 532 Strategic Human Resource Management

BUS 541 Management Information Systems

BUS 561 Marketing Management and Strategy

BUS 571 Production and Operations Management

Analytical Techniques

ACC 581 Survey of Financial Accounting

ACC 582 Survey of Management Accounting

ST 503 Statistics for Management

Technical Concentration

BUS 574 Management of Technology

BUS 583 Management Practicum

Minimum of 9 hours of additional courses in the technical concentration. Technical concentrations include management of technology, management information systems and operations management.

Admission Requirements: Students must have previous courses in calculus, principles of economics (micro and macro) and statistics, as well as knowledge of personal computers including word processing and spreadsheet software. In addition to basic Graduate School admission requirements, applicants must submit recent GMAT scores. Admission decisions are based on academic performance and potential, GMAT scores, the applicant's essay indicating how the MSM degree will further his/her career and work experience, where appropriate. For further information, there is an MSM Home Page that can be accessed off the home page of the College of Management.

Other Relevant Information: Day and evening courses are available; students can attend on either a part-time or full-time basis.

Minor in Management: Students enrolled in master's and doctoral programs can complete the minor by taking courses that meet requirements for the MSM degree. Master's students must take nine hours, including both ACC 581 and BUS 531. Doctoral students must take 15 hours, including both ACC 581 and BUS 531. This is distinct from the departmental minor in business management which simply requires nine hours of course work at the 500 level or above for master's students.

GRADUATE COURSES

- BUS 501 Legal and Regulatory Environment in Management.**
- BUS 502 Global and Cultural Environment in Management.**
- BUS 504 Technology, Competition and the Law.**
- BUS 521 Managerial Finance.**
- BUS 522 Portfolio and Capital Market Theory.**
- BUS 524 Financial Markets and Institutions.**
- BUS 527 Risk Management.**
- BUS 528 Short-term Capital Management.**
- BUS 529 New Firm Financing.**
- BUS 531 Managerial Processes and Effectiveness.**
- BUS 532 Strategic Human Resource Management.**
- BUS 533 Leadership in Management.**
- BUS 537 Incentives and Conflict Resolution in Organizations.**
- BUS 541 Information Technology and Management.**
- BUS 542 Networking and Productivity.**
- BUS 545 Management Support Systems.**
- BUS 546 Analysis and Design of Management Support Systems.**
- BUS 547 Management Support Systems Project.**
- BUS 549 Managerial Issues in Information Systems.**
- BUS 561 Marketing Management and Strategy.**
- BUS 562 Research Methods in Marketing.**
- BUS 565 Product Design and Development.**
- BUS 571 Production and Operations Management.**
- BUS 572 Operations Planning and Control.**
- BUS 573 Supply Chain Management.**
- BUS 574 Management of Technology.**
- BUS 575 Managing for Quality.**
- BUS(MAT) 576 Technology Evaluation and Commercialization Concepts.**
- BUS(MAT) 577 Technology Evaluation and Strategy.**
- BUS(MAT) 578 High Technology Entrepreneurship.**
- BUS 579 Operations Strategy.**
- BUS 581 Long Range Analysis and Strategy.**
- BUS 582 Management Practicum.**
- BUS 583 Management Practicum.**
- BUS(TAM) 585 Market Research in Textiles.**
- BUS 590 Special Topics in Business Management.**
- BUS 630 Independent Study.**

Marine, Earth and Atmospheric Sciences

Degrees Offered: Ph.D., M.S.

GRADUATE FACULTY

Professor L. J. Pietrafesa, *Head of the Department*

Professor G. S. Janowitz, *Director of Graduate Programs*

Box 8208, (919) 515-7776, janowitz@ncsu.edu

Distinguished University Scholar: T. F. Malone

Scholar in Residence: R. R. Braham

Professors: S. P. S. Arya, N. E. Blair, V. V. Cavaroc Jr., J. M. Davis, D. J. DeMaster, R. V. Fodor, D. Kamykowski, Y. Lin, S. Raman, V. K. Saxena, T. G. Wolcott; *Research Professor:* V. P. Aneja; *Visiting Professors:* T. F. Clark, T. S. Hopkins, H. G. Reichle Jr., D. A. Russell; *Adjunct Professors:* S. W. Chang, J. J. DeLuisi, A. H. Hines, R. V. Madala, P. J. Minnett, J. M. Pelissier, S. R. Riggs, W. H. Snyder; *Professors Emeriti:* H. S. Brown, L. J. Langfelder, C. J. Leith, W. J. Saucier, C. W. Welby; *Associate Professors:* J. P. Hibbard, M. M. Kimberley, C. E. Knowles, S. E. Koch, E. L. Leithold, J. M. Morrison, A. J. Riordan, F. H. M. Semazzi, P. Shaw, W. J. Showers, E. F. Stoddard, G. F. Watson, D. L. Wolcott; *Visiting Associate Professor:* M. L. Kaplan; *Adjunct Associate Professors:* M. G. Bevis, V. S. Connors, R. W. Wiener; *Assistant Professors:* T. G. Drake, D. B. Eggleston, D. G. Evans, S. W. Snyder; *Visiting Assistant Professors:* R. E. Barrick, L. Xie; *Adjunct Assistant Professors:* D. M. Checkley Jr., G. J. Kirkpatrick, S. W. Ross, R. J. Wayland

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: B. J. Copeland, J. M. Miller, F. Y. Sorrell Jr., C. C. Tung; *Associate Professor:* J. M. Burkholder; *Visiting Assistant Professor:* L. L. Spence

INTERINSTITUTIONAL ADJUNCT GRADUATE FACULTY

L. B. Cahoon, D. G. Lindquist, J. F. Parnell, J. R. Pawlik, M. H. Posey, R. D. Roer

Graduate majors in atmospheric science, geology, geophysics, and marine sciences are offered. Within marine sciences the subdisciplines of biological, chemical, geological and physical oceanography are recognized by the profession.

Admission Requirements: An M.S. degree is required for entry into the Ph.D. program. The GRE Subject Test scores are required only for applicants in geology and biological oceanography. A B.S. degree in a basic or applied science, mathematics or engineering is required for entry into the M.S. program in atmospheric science, geology or geophysics, biological oceanography, chemical oceanography, geological oceanography, or physical oceanography. Field camp is required of all applicants for the M.S. program in geology. An M.S. degree with a non-thesis option for students on leave for a fixed period from government positions is available and admission to this option must be requested at the time of application.

Master's Degree Requirements: Specific course requirements are determined by the advisory committee of each student. However, MEA 601 Seminar is required of all M.S. students no later than the third semester in residence. Marine science students are required to take core courses in two of the three subdisciplines other than their own.

Doctoral Degree Requirements: Specific courses are determined by the students advisory committee. Registration in seminar, MEA 801, is required of all Ph.D. students no later than the fourth semester in residence. Marine science students are required to take core courses in all three subdisciplines other than their own; this requirement may be fulfilled at the M.S. level.

Student Financial Support: Research and teaching assistantships are available.

Other Relevant Information: Students are assigned advisors upon admission, and thesis research should commence as soon as possible.

GRADUATE COURSES IN COMMON TO ALL MEA STUDENTS

- MEA 601 Seminar.
- MEA 685 Master's Supervised Teaching.
- MEA 690 Master's Examination.
- MEA 693 Master's Supervised Research.
- MEA 695 Master's Thesis Research.
- MEA 699 Master's Thesis Preparation.
- MEA 801 Seminar.
- MEA 885 Doctoral Supervised Teaching.
- MEA 890 Doctoral Preliminary Examination.
- MEA 893 Doctoral Supervised Research.
- MEA 895 Doctoral Dissertation Research.
- MEA 899 Doctoral Dissertation Preparation.

GRADUATE COURSES

Atmospheric Science

- MEA 510 Air Pollution Meteorology.
- MEA 512 Satellite Meteorology.
- MEA 513 Radar Meteorology.
- MEA 514 Advanced Physical Meteorology.
- MEA 593 Special Topics in Atmospheric Science.
- MEA 613 Special Topics in Atmospheric Science.
- MEA 701 Environmental Fluid Mechanics.
- MEA 702 Advanced Cloud and Precipitation Physics.
- MEA 703 Atmospheric Aerosols.
- MEA 705 Dynamic Meteorology.
- MEA 706 Meteorology of the Biosphere.
- MEA 707 Planetary Boundary Layer.
- MEA 708 Atmospheric Turbulence.
- MEA 710 Atmospheric Dispersion.
- MEA 712 Mesoscale Modeling.
- MEA 713 Mesoscale Dynamics.
- MEA 714 Atmospheric Convection.
- MEA 716 Numerical Weather Prediction.
- MEA 717 Advanced Weather Analysis.
- MEA 719 Climate Modeling.
- MEA 720 Coastal Meteorology.
- MEA 721 Air-Sea Interaction.
- MEA(MAE) 725 Geophysical Fluid Mechanics.
- MEA(MAE) 726 Advanced Geophysical Fluid Mechanics.
- MEA 793 Advanced Special Topics in Atmospheric Science.
- MEA 813 Special Topics in Atmospheric Science.

Earth Science

- MEA 570 Geological Oceanography.
- MEA 574 Advanced Igneous Petrology.
- MEA 575 Advanced Metamorphic Petrology.
- MEA 576 Applied Sedimentary Analysis.
- MEA 577 Electron Microprobe Analysis of Geologic Material.
- MEA 578 Depositional Environments and Lithostratigraphy.
- MEA 585 Hydrogeology.
- MEA 592 Special Topics in Earth Science.
- MEA 599 Regional Geology of North America.
- MEA 612 Special Topics in Earth Science.

MEA 758 Laboratory and Field Methods for Investigation of the Seabed.
MEA 759 Organic Geochemistry.
MEA 760 Biogeochemistry.
MEA 763 Geochemistry.
MEA 764 Sedimentary Geochemistry.
MEA 785 Hydrogeology of Groundwater Pollution and Protection.
MEA 788 Advanced Structural Geology.
MEA 789 Topics in Appalachian Geology.
MEA 790 Geotectonics.
MEA 792 Advanced Special Topics in Earth Science.
MEA 794 Regional Tectonics.
MEA 795 Photogeology and Remote Sensing.
MEA 796 Exploration and Engineering Geophysics.
MEA 812 Special Topics in Earth Science.

Marine Science

MEA 540 Principles of Physical Oceanography.
MEA(ZO) 550 Principles of Biological Oceanography.
MEA 560 Principles of Chemical Oceanography.
MEA 562 Marine Sediment Transport.
MEA 570 Geological Oceanography.
MEA 591 Special Topics in Marine Science.
MEA 611 Special Topics in Marine Science.
MEA 700 Environmental Fluid Mechanics.
MEA 721 Air-Sea Interaction.
MEA(MAE) 725 Geophysical Fluid Mechanics.
MEA(MAE) 726 Advanced Geophysical Fluid Mechanics.
MEA 735 Fourier Analysis of Geophysical Data.
MEA 741 Synoptic Physical Oceanography.
MEA(CE) 742 Gravity Wave Theory I.
MEA 743 Ocean Circulation.
MEA 744 Dynamics of Shelf Circulation.
MEA 745 the Physical Dynamics of Estuaries.
MEA (ZO) 750 Marine Benthic Ecology.
MEA 752 Marine Plankton Ecology.
MEA(ZO) 754 Advances in Marine Community Ecology.
MEA(ZO) 756 Ecology of Fishes.
MEA 758 Laboratory and Field Methods for Investigation of the Seabed.
MEA 759 Organic Geochemistry.
MEA 760 Biogeochemistry.
MEA 762 Marine Geochemistry.
MEA 767 Continental Margin Sedimentation.
MEA(MAE) 768, 769 Perturbation Method in Fluid Mechanics I, II.

MEA 791 Advanced Special Topics in Marine Science.

MEA 811 Special Topics in Marine Science.

Master of Engineering

For program information, see engineering.

Materials Science and Engineering

Degrees Offered: Ph.D., M.S., Master of Materials Science and Engineering

GRADUATE FACULTY

Professor J. J. Hren, Head of the Department

Professor C. C. Koch, Director of Graduate Programs

Box 7907, (919) 515-7340, carl_koch@mte.ncsu.edu

Distinguished University Professor: J. Narayan

Distinguished University Research Professor: J. J. Cuomo

Kobe Steel Distinguished University Professor and Graduate Alumni Distinguished Professor: R. F. Davis

Professors: K. J. Bachmann, R. B. Benson Jr., N. A. El-Masry, A. I. Kingon, K. L. Murty, G. A. Rozgonyi, P. E. Russell, R. O. Scattergood; *Research Professor:* D. M. Maher; *Visiting Professor:* J. C. Russ; *Adjunct Professors:* O. H. Auciello, G. L. Doll, J. T. Glass, F. Shimura; *Professors Emeriti:* W. W. Austin Jr., H. Conrad, A. A. Fahmy, J. K. Magor, K. L. Moazed, H. Palmour III, H. H. Stadelmaier, R. F. Stoops; *Associate Professors:* C. M. Balik, D. W. Brenner, Z. Sitar, R. J. Spontak; *Research Associate Professor:* J. Kasichainula; *Visiting Associate Professor:* D. P. Griffis; *Adjunct Associate Professor:* J. T. Prater; *Associate Professor Emeritus:* J. V. Hamme; *Visiting Assistant Professor:* D. Venables; *Adjunct Assistant Professor:* S. D. Smith

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: D. E. Aspnes, J. A. Bailey, S. M. Bedair, K. S. Havner, Y. Horie, G. Lucovsky, R. J. Nemanich, A. Reisman; *Associate Professors:* H. W. Ade, H. H. Lamb; *Assistant Professor:* G. N. Parsons

Materials and materials limitations pervade all of the engineering and high technology fields that are an integral part of our society. Graduate programs in this department focus on understanding the structure, structure modification and

properties of materials and the development of new or improved materials and advanced processing methods which are critical links between the design and the realization of new systems.

Admission Requirements: In addition to the general admission requirements as set by the Graduate School, the department requires submission of GRE scores or convincing evidence of the competence of the applicant and his/her ability to satisfy the requirements for the graduate degree for which he/she is seeking admission. In addition, for applicants whose native tongue is other than English, the minimum acceptable TOEFL score is 575.

Master's Degrees Requirements: The minimum requirements for the Master of Materials Science and Engineering degree are 33 credit hours. The M.S. degree has the minimum requirement of 30 credit hours including six credit hours for research.

Doctoral Degree Requirements: The minimum requirements for the doctoral degree are 72 credit hours including 21 to 25 credit hours for research, 2 to 6 hours of the teaching course, a minimum of 9 credit hours at or above the 720 level, excluding research credit, and 12 credit hours in one or more supporting fields of which no more than 3 credit hours may be at the 400 level.

Student Financial Support: In recent years most students in the graduate program have received financial support in the form of research or teaching assistantships or fellowships.

Other Relevant Information: The department reflects the interdisciplinary nature of the field of materials science and engineering. A substantial number of current graduate students majored in fields other than but related to materials, and the department has a significant number of associated graduate faculty from other departments supervising thesis and dissertation research.

FOR GRADUATES AND ADVANCED UNDERGRADUATES

MAT 556 Composite Materials.

MAT 560 Materials Science in Processing of Semiconductor Devices.

MAT(TC) 561 Organic Chemistry of Polymers.

MAT(BUS) 576 Technology Evaluation and Commercialization Concepts.

MAT(BUS) 577 Technology Evaluation and Strategy.

MAT(BUS) 578 High Technology Entrepreneurship.

MAT 601 Seminar.

MAT 685 Master's Supervised Teaching.

MAT 690 Master's Examination.

MAT 693 Master's Supervised Research.

MAT 695 Master's Thesis Research.
MAT 699 Master's Thesis Preparation.
MAT 700 Modern Concepts in Materials Science.
MAT 701 Diffusion and Mass Transport Processes in Solids.
MAT 702 Defects in Solids.
MAT 704 Electrical, Optical and Magnetic Properties of Materials.
MAT 705 Mechanical Behavior of Engineering Materials.
MAT 706 Phase Transformations and Kinetics.
MAT(CH) 707 Chemical Concepts in Materials Science and Engineering.
MAT 708 Thermodynamics of Materials.
MAT 710 Elements of Crystallography and Diffraction.
MAT 711 Stereology and Image Analysis.
MAT 712 Scanning Electron Microscopy.
MAT 715 Transmission Electron Microscopy.
MAT 720 Advanced Crystallography and Diffraction.
MAT 721 Theory and Structure of Amorphous Materials.
MAT 722 Advanced Scanning Electron Microscopy and Surface Analysis.
MAT 723 Theory and Structure of Metallic Materials.
MAT(NE) 725 Nuclear Materials.
MAT(MAE) 731 Materials Processing by Deformation.
MAT(MAE) 732 Fundamentals of Metal Machining Theory.
MAT 733 Advanced Ceramic Engineering Design.
MAT 741 Principles of Corrosion.
MAT 751 Thin Film and Coating Science and Technology I.
MAT 752 Thin Film and Coating Science and Technology II.
MAT 753 Advanced Mechanical Properties of Materials.
MAT(TC) 762 Physical Chemistry of High Polymers--Bulk Properties.
MAT 770 Defects, Diffusion and Ion Implantation in Semi-conductors.
MAT(CH,TC) 772 Physical Chemistry of High Polymers--Solution Properties.
MAT(NE) 773 Computer Experiments in Materials and Nuclear Engineering.
MAT 775 Structure of Semicrystalline Polymers.
MAT 791, 792 Advanced Topics in Materials Science and Engineering.
MAT 795 Advanced Materials Experiments.
MAT 801 Seminar.
MAT 885 Doctoral Supervised Teaching.
MAT 890 Doctoral Preliminary Examination.
MAT 893 Doctoral Supervised Research.
MAT 895 Doctoral Dissertation Research.
MAT 899 Doctoral Dissertation Preparation.

Mathematics

Degrees Offered: Ph.D., M.S.

GRADUATE FACULTY

Professor R. H. Martin Jr., *Head of the Department*

Professor S. L. Campbell, *Director of Graduate Programs*

Professor E. L. Stitzinger, *Associate Director of Graduate Programs*

Box 8205, (919) 525-3964, s_campbell@ncsu.edu, stitz@math.ncsu.edu

Drexel Professor and University Professor: H. T. Banks

Professors: J. W. Bishir, E. E. Burniston, R. E. Chandler, M. T. Chu, E. N. Chukwu, L. O. Chung, J. D. Cohen, J. C. Dunn, A. C. Fauntleroy, J. E. Franke, R. O. Fulp, R. E. Hartwig, I. Ipsen, K. Ito, E. L. Kaltofen, C. T. Kelley, K. Koh, X. Lin, J. Luh, J. A. Marlin, C. D. Meyer Jr., K. C. Misra, C. Pao, E. L. Peterson, M. S. Putcha, S. Schecter, J. F. Selgrade, M. Shearer, C. E. Siewert, J. W. Silverstein, M. F. Singer, R. E. White; *Professors Emeriti:* R. C. Bullock, J. M. Clarkson, J. M. Danby, W. J. Harrington, J. Levine, L. B. Martin Jr., P. A. Nickel, H. V. Park, N. J. Rose, H. Sagan, R. A. Struble; *Associate Professors:* G. D. Faulkner, B. G. Fitzpatrick, D. E. Garoutte, A. G. Helminck, P. Hitczenko, N. Jing, A. Kheyfets, T. J. Lada, D. M. Latch, L. K. Norris, L. B. Page, R. T. Ramsay, F. L. Reitich, J. Rodriguez, J. S. Scroggs, R. Silber, H. T. Tran; *Associate Professor Emeritus:* D. F. Ullrich; *Assistant Professors:* H. J. Charlton, F. J. Garaizar, P. A. Gremaud, D. J. Hansen, W. M. McEneaney, W. R. McKinney, S. O. Paur

ASSOCIATE MEMBER OF THE PROGRAM

Associate Professor: L. V. Stiff; *Assistant Professor:* J. D. Brown

The Department of Mathematics offers programs leading to the degrees of Master of Science and Doctor of Philosophy in mathematics and in applied mathematics. Students may opt for the concentration in computational mathematics, which is attached to the program in applied mathematics. Through the Center for Research in Scientific Computation, which is housed in the Department of Mathematics, students may participate in the industrial applied mathematics program, a program of joint research endeavors with industrial and governmental partners.

Admissions Requirements: Applicants for admission should have an undergraduate or master's degree in mathematics or the equivalent. This should include courses in advanced calculus, modern algebra and linear algebra. Applicants with degrees in

other subjects may be admitted but may be required to take certain undergraduate courses in mathematics without receiving graduate credit. It is recommended that applicants take the GRE Advanced Test in Mathematics.

Master of Science Requirements: In addition to course requirements, the M.S. degree requires a written master's project for 3 hours credit.

Ph.D. Requirements: A student will typically take 50-60 semester hours of course credits for the Ph.D. These courses include one semester of modern algebra and one semester of mathematical analysis. The written preliminary examination consists of examinations in three selected areas of mathematics. Prior to taking the preliminary oral examination, the student must demonstrate a working knowledge of a foreign language. The research dissertation should represent a substantial contribution to an area of mathematics or its applications.

Student Financial Support: Teaching assistantships and some research assistantships are available. Teaching assistants benefit from a structured program of training in university-level teaching.

Other Information: The Department of Mathematics has more than twenty workstations devoted exclusively to its graduate students. Students also have access to the high-performance computing and visualization equipment at the North Carolina Supercomputer Center.

GRADUATE COURSES

- MA 501 Advanced Mathematics for Engineers and Scientists I.
- MA 502 Advanced Mathematics for Engineers and Scientists II.
- MA(OR) 504 Introduction to Mathematical Programming.
- MA(IE,OR) 505 Linear Programming.
- MA 507 Analysis for Secondary Teachers.
- MA 508 Geometry for Secondary Teachers.
- MA 509 Abstract Algebra for Secondary Teachers.
- MA 510 Selected Topics in Mathematics for Secondary Teachers.
- MA 511 Advanced Calculus I.
- MA 512 Advanced Calculus II.
- MA 513 Introduction to Complex Variables.
- MA 515 Analysis I.
- MA 520 Linear Algebra.
- MA 521 Abstract Algebra I.
- MA 522 Computer Algebra.
- MA 523 Linear Transformations and Matrix Theory.
- MA(E,OR) 531 Dynamic Systems and Multivariable Control I.

MA 532 Ordinary Differential Equations I.
 MA 534 Introduction to Partial Differential Equations.
 MA 535 Stability and Time Optimal Control of Hereditary Systems I.
 MA 537 Nonlinear Dynamics and Chaos.
 MA 544 Computer Experiments in Mathematical Probability.
 MA(ST) 546 Theory of Probability I.
 MA 551 Introduction to Topology.
 MA 555 Introduction to Manifold Theory.
 MA 561 Set Theory and Foundations of Mathematics.
 MA(CSC,OR) 565 Graph Theory.
 MA(BMA) 573 Mathematical and Experimental Modeling of Physical Processes
 I.
 MA 574 Mathematical and Experimental Modeling of Physical Processes
 II.
 MA(PY) 575 Mathematical Introduction to Celestial Mechanics.
 MA(PY) 576 Orbital Mechanics.
 MA(CSC) 580 Numerical Analysis I.
 MA 584 Numerical Solution of Partial Differential Equations--Finite Difference
 Methods.
 MA 587 Numerical Solution of Partial Differential Equations--Finite Element
 Method.
 MA 591 Special Topics.
 MA 676 Master's Project.
 MA 685 Master's Supervised Teaching.
 MA 690 Master's Examination.
 MA 693 Master's Supervised Research.
 MA 695 Master's Thesis Research.
 MA 699 Master's Thesis Preparation.
 MA(ST,OR) 706 Nonlinear Programming.
 MA(OR) 708 Integer Programming.
 MA 711 Analytic Function Theory I.
 MA 712 Analytic Function Theory II.
 MA 713 Techniques of Complex Analysis.
 MA 715 Analysis II.
 MA 716 Advanced Functional Analysis.
 MA(OR) 719 Vector Space Methods in System Optimization.
 MA 720 Lie Algebras.
 MA 721 Abstract Algebra II.
 MA 723 Theory of Matrices and Applications.
 MA(E,OR) 731 Dynamic Systems and Multivariable Control II.
 MA 732 Ordinary Differential Equations II.
 MA 734 Partial Differential Equations.
 MA 735 Stability and Time Optimal Control of Hereditary Systems II.

MA(ST) 746 Introduction to Stochastic Processes.
 MA 751 Topology.
 MA 753 Algebraic Topology.
 MA 755 Introduction to Riemannian Geometry.
 MA 756 Geometrical Structures on Fiber Bundles.
 MA(IE,OR) 766 Network Flows.
 MA(BMA,ST) 771 Biomathematics I.
 MA(BMA,ST) 772 Biomathematics II.
 MA(BMA,OR,ST) 773 Stochastic Modeling.
 MA 775 Mathematical Methods in the Physical Sciences I.
 MA 776 Mathematical Methods in the Physical Sciences II.
 MA(NE) 777 Exact and Approximate Solutions in Particle Transport Theory.
 MA(ST) 778, 779 Measure Theory and Advanced Probability.
 MA(CSC) 780 Numerical Analysis II.
 MA 782 Advanced Numerical Linear Algebra.
 MA(CSC) 783 Parallel Algorithms and Scientific Computation.
 MA 784 Nonlinear Equations and Unconstrained Optimization.
 MA 785 Numerical Solution of Ordinary Differential Equations.
 MA 788 Numerical Nonlinear Partial Differential Equations.
 MA(IE,OR) 790 Advanced Special Topics in System Optimization.
(The subject matter in the following special topics courses varies from year to year. The topics and instructors are announced well in advance by the department.)
 MA 791 Special Topics in Real Analysis.
 MA 792 Special Topics in Algebra.
 MA 793 Special Topics in Differential Equations.
 MA 795 Special Topics in Topology.
 MA 796 Special Topics in Combinatorial Analysis.
 MA 797 Special Topics in Applied Mathematics.
 MA 798 Special Topics in Numerical Analysis.
 MA(OE,OR) 812 Special Topics in Mathematical Programming.
 MA(IE,OR) 816 Advanced Special Topics in Systems Analysis and Optimization.
 MA 885 Doctoral Supervised Teaching.
 MA 890 Doctoral Preliminary Examination.
 MA 893 Doctoral Supervised Research.
 MA 895 Doctoral Dissertation Research.
 MA 899 Doctoral Dissertation Preparation.

Mathematics Education

For a listing of graduate faculty and program information, see mathematics, science and technology education.

Mathematics, Science and Technology Education

Degrees Offered: Ph.D., Ed.D., M.S., M.Ed.

GRADUATE FACULTY

Professor J. Penick, Head of the Department

Associate Professor W. M. Waters Jr., Director of Graduate Programs, Mathematics Education, waters @poe.coe.ncsu.edu

Associate Professor S. L. Westbrook, Director of Graduate Programs, Science Education, westbrk@poe.coe.ncsu.edu

Associate Professor R. E. Wenig, Director of Graduate Programs, Technology Education, wenig@poe.coe.ncsu.edu

Box 7801, (919) 515-1742

Professors: S. B. Berenson, L. M. Clark, J. R. Kolb; Professors Emeriti: D. A. Adams, N. D. Anderson, J. K. Coster, C. C. Scarborough; Associate Professors: V. W. DeLuca, W. J. Haynie III, K. S. Norwood, J. C. Park, R. E. Peterson, L. V. Stiff, L. W. Watson, J. H. Wheatley; Research Associate Professor: H. S. Stubbs; Associate Professor Emeritus: H. A. Shannon; Assistant Professors: G. S. Carter, W. J. Vander Wall, E. N. Wiege; Visiting Assistant Professors: A. C. Clark, J. M. Gleason, D. Vidakovic; Adjunct Assistant Professors: W. Smith Jr., W. E. Spooner; Assistant Professor Emeritus: J. L. Crow

The Department of Mathematics, Science and Technology Education offers graduate programs in occupational education and technology education that lead to the degrees of Master of Science, Master of Education and Doctor of Education. Students take courses in their educational specialty, in general professional education and in a social science cognate area. Graduate programs in mathematics education and science education lead to the degrees of Master of Science, Master of Education and Doctor of Philosophy. Students take courses in their educational specialty in one of the teaching specializations: biological sciences, chemistry, computer science, earth science, interdisciplinary science, mathematics, physics, statistics.

Master's programs are offered leading to graduate-level (G) certification as a teacher of mathematics, science, technology or occupational exploration at grades 6-9 or 9-12 for those who have initial (A) certification. Programs are also available for those seeking advanced graduate-level (AG) certification as a teacher or certification as a local vocational director. Students may choose a program to prepare for teaching careers in post-secondary education.

Admission Requirements: Applicants for all of the M.S. and M.Ed. degrees and Ed.D. in occupational education or technology education may submit recent scores

from the GRE General Test or on the Miller's Analogy Test. Applicants for the Ph.D. in mathematics education or science education must submit recent scores from the GRE General Test. Academic and professional background necessary for admission differs by specific program.

Master's Degree Requirements: The master's degree programs require a minimum of 36 semester hours of graduate work. Students who elect the M.S. substitute up to 6 semester hours of thesis research for part of the course load.

Doctoral Degree Requirements: (Ed.D.) A minimum of 90 semester hours of graduate work beyond the baccalaureate degree is required including a minimum of 12 semester hours of dissertation research. **(Ph.D.)** A minimum of 45 semester hours of course work, a minimum of 12 semester hours of dissertation research and one foreign language is required beyond the master's degree requirements. For both degrees, students may be required to supplement their course work with internships and/or other experiential activities to meet competencies.

Student Financial Support

A small number of teaching and research assistantships are available and out-of-state tuition remission may be available for one year to students on assistantships.

GRADUATE COURSES

EMS 511 Implications of Mathematical Content, Structure and Processes for the Teaching of Mathematics in the Elementary School.

EMS 591 Special Problems in Mathematics Teaching.

EMS 592 Special Problems in Science Teaching.

EMS 621 Special Problems in Mathematics Teaching.

EMS 622 Special Problems in Science Teaching.

EMS 641 Practicum in Science and Mathematics Education.

EMS 651 Internship in Mathematics, Science and Technology Education.

EMS 685 Master's Supervised Teaching.

EMS 686 Teaching in College.

EMS 690 Master's Examination.

EMS 692 Master's Research Project.

EMS 693 Master's Supervised Research.

EMS 695 Master's Thesis Research.

EMS 699 Master's Thesis Preparation.

EMS 703 Teaching Mathematics and Science in Higher Education.

EMS 704 Curriculum Development and Evaluation in Science and Mathematics.

EMS 705 Education and Supervision of Teachers of Mathematics and Science.

EMS 712 Teaching Mathematics in Elementary and Junior High School.

EMS 770 Foundations of Mathematics Education.

EMS 775 Foundations of Science Education.
 EMS 777 Improving Classroom Instruction in Science.
 EMS 792 Special Problems in Mathematics Teaching.
 EMS 794 Special Problems in Science Teaching.
 EMS 802 Seminar in Mathematics Education.
 EMS 803 Seminar in Science Education.
 EMS 821 Special Problems in Mathematics Teaching.
 EMS 822 Special Problems in Science Teaching.
 EMS 841 Practicum in Science and Mathematics Education.
 EMS 851 Internship in Mathematics, Science and Technology Education.
 EMS 885 Doctoral Supervised Teaching.
 EMS 890 Doctoral Preliminary Examination.
 EMS 892 Doctoral Research Project.
 EMS 893 Doctoral Supervised Research.
 EMS 895 Doctoral Dissertation Research.
 EMS 899 Doctoral Dissertation Preparation.
 EOE 610 Special Topics.
 EOE 621 Special Problems in Occupational Education.
 EOE 641 Practicum in Occupational Education.
 EOE 651 Internship in Occupational Education.
 EOE 662 Planning and Organizing Industrial and Technical Education Programs.
 EOE 685 Master's Supervised Teaching.
 EOE 690 Master's Examination.
 EOE 692 Master's Research Project.
 EOE 693 Master's Supervised Research.
 EOE 695 Master's Thesis Research.
 EOE 699 Master's Thesis Preparation.
 EOE 701 Philosophy of Occupational Education.
 EOE 702 Laws, Regulations and Policies Affecting Occupational Education.
 EOE 705 Curriculum Materials Development.
 EOE 706 Cooperative Occupational Education.
 EMS 709 Seminar in Occupational Education.
 EOE 710 Career Exploration.
 EOE 712 Analysis of Occupational Information, Trends and Labor Market.
 EOE 722 Finance, Accounting and Management of Occupational Education Programs.
 EOE 751 Technology Education: a Discipline.
 EOE 752 Curricula for Emerging Technologies.
 EOE 755 Developing and Implementing Technology Education.
 EOE 758 Teaching Creative Problem Solving.
 EOE 765 Advanced Trade Analysis and Course Construction.
 EOE 779 Research Application in Occupational Education.

EMS 797 Special Topics.
 EOE 802 Seminar in Occupational Education.
 EOE 810 Special Topics.
 EOE 821 Special Problems in Occupational Education.
 EOE 841 Practicum in Occupational Education.
 EOE 851 Internship in Occupational Education.
 EOE 885 Doctoral Supervised Teaching.
 EOE 892 Doctoral Research Project.
 EOE 895 Doctoral Dissertation Research.
 EOE 899 Doctoral Dissertation Preparation.
 TED 709 Seminar in Technology Education.
 TED 797 Special Topics in Technology Education.

Mechanical Engineering

For a listing of graduate faculty and program information, see mechanical and aerospace engineering.

Mechanical and Aerospace Engineering

Degrees Offered: Ph.D., M.S., Master of Mechanical Engineering

GRADUATE FACULTY

Graduate Alumni Distinguished Professor F. R. DeJarnette, *Head of the Department*

Professor J. C. Mulligan, *Director of Graduate Programs*
 Box 7910, (919) 515-3026

Graduate Alumni Distinguished Professor: H. A. Hassan

Professors: E. M. Afify, J. A. Bailey, A. E. Bayoumi, T. A. Dow, H. M. Eckerlin, J. A. Edwards, T. H. Hodgson, R. F. Keltie, C. Kleinstreuer, G. K. F. Lee, C. J. Maday, D. S. McRae, R. T. Nagel, J. N. Perkins, L. H. Royster, L. M. Silverberg, F. Y. Sorrell Jr., J. S. Strenkowski, G. D. Walberg; *Visiting Professor:* M. M. Fikry; *Adjunct Professors:* J. P. Archie Jr., D. P. DeWitt, W. D. Erickson, J. Juan, D. E. Klett, E. R. McClure, R. A. Whisnant; *Professors Emeriti:* R. A. Burton, M. H. Clayton, B. H. Garcia Jr., W. C. Griffith, F. J. Hale, F. D. Hart, M. N. Ozisik, F. O. Smetana, J. K. Whitfield, C. F. Zorowski; *Associate Professors:* M. A. Boles, N. Chokani, J. W. David, J. W. Eischen, R. D. Gould, C. E. Hall Jr., R. R. Johnson, E. C. Klang, J. W. Leach, P. I. H. Ro, F. Yuan, M. A. Zikry; *Research Associate Professor:* J. S. Stewart; *Adjunct Associate*

Professors: G. V. Candler, J. G. Cleland, A. C. Eberhardt, J. H. Hebrank, K. R. Iyer, C. S. Kim, D. W. Lee, R. M. Potter, Jr., H. Singh; **Assistant Professors:** J. R. Edwards Jr., L. P. Franzoni, K. M. Lyons, M. K. Ramasubramanian, W. L. Roberts IV; **Research Assistant Professor:** J. Y. Sheikh-Ahmad; **Visiting Assistant Professor:** A. V. Kuznetsov; **Adjunct Assistant Professors:** D. P. Colvin, J. A. Cooke, K. J. Falter, A. O. Hobbs, S. D. Holland, M. R. Jolly, M. A. Norris, M. T. Odman, D. J. Rossetti, Q. Shen, S. C. Southward, M. R. Spano Sr., R. J. Stanley II, M. E. Tauber

INTERINSTITUTIONAL ADJUNCT GRADUATE FACULTY

V. S. Avva, S. Chandra, P. H. DeHoff

Course offerings and research programs are available in the following areas: thermodynamics and energy conversion, heat and mass transfer, fluid mechanics, combustion, acoustics and noise control, machine design, vibration, gas dynamics and aerodynamics, aeroelasticity, CFD, finite elements, structures, controls, precision engineering, materials processing and tribology.

Admission Requirements: An applicant to the master's program must be a graduate of an accredited undergraduate program with a B.S. degree in either mechanical or aerospace engineering. Graduates of other accredited programs in engineering, physical sciences and mathematics may be considered but will be required to make up undergraduate deficiencies without graduate credit. Provisional admissions, as well as exceptions, are sometimes granted under special circumstances. The most qualified applicants are accepted first. Applicants to the Ph.D. program must have met the M.S. admission requirements, completed the M.S. degree in mechanical engineering or aerospace engineering and additionally must satisfy the Ph.D. qualifying requirements.

Master's Degree Requirements: The non-thesis Master of Mechanical Engineering degree requires 27 hours of course credit and a six-hour project.

Ph.D. Degree Requirements: A minimum of 54 hours of credit beyond the master's program is required.

Student Financial Support: Various types of assistantships and fellowships are available. Awards are made to the most qualified applicants first and generally are not available for all students.

Other Relevant Information: Each new student chooses an area of specialty, selects an advisor and committee, customizes a program of study and begins research in the

first semester of residence. The Director of Graduate Programs acts as a temporary advisor initially and should be contacted with questions.

GRADUATE COURSES

- MAE 503 Advanced Power Plants.**
- MAE 510 Effects of Noise and Vibration on Man.**
- MAE 514 Noise and Vibration Control.**
- MAE 517 Instrumentation in Sound and Vibration Engineering.**
- MAE 524 Principles of Structural Control.**
- MAE(WPS) 534 Mechatronics Design.**
- MAE 540 Advanced Air Conditioning Design.**
- MAE 545 Metrology for Precision Manufacturing.**
- MAE 586 Project Work in Mechanical Engineering.**
- MAE 589 Special Topics in Mechanical Engineering.**
- MAE 601 Seminar.**
- MAE 685 Master's Supervised Teaching.**
- MAE 690 Master's Examination.**
- MAE 693 Master's Supervised Research.**
- MAE 695 Master's Thesis Research.**
- MAE 699 Master's Thesis Preparation.**
- MAE 701 Advanced Engineering Thermodynamics.**
- MAE 702 Statistical Thermodynamics.**
- MAE 703 Dynamics of Internal Fluid Flow.**
- MAE 704 Fluid Dynamics of Combustion I.**
- MAE 705 Fluid Dynamics of Combustion II.**
- MAE 706 Heat Transfer Theory and Applications.**
- MAE 707 Advanced Conductive Heat Transfer.**
- MAE 708 Advanced Convective Heat Transfer.**
- MAE 709 Advanced Radiative Heat Transfer.**
- MAE 713 Principles of Structural Vibration.**
- MAE 714 Analytical Methods in Structural Vibration.**
- MAE 715 Nonlinear Vibrations.**
- MAE 716 Random Vibration.**
- MAE 718 Acoustic Radiation I.**
- MAE 719 Acoustic Radiation II.**
- MAE(IE) 720 Industrial Robotics.**
- MAE 721 Linear Control and Design for Mino Systems.**
- MAE 722 Real Time Digital Filtering and Control.**
- MAE 723 Mechanics of Machinery.**
- MAE(MEA) 725 Geophysical Fluid Mechanics.**
- MAE(MEA) 726 Advanced Geophysical Fluid Mechanics.**
- MAE 727 Computational Methods in Structural Vibration.**

MAE 730 Modern Plasticity.
MAE(MAT) 731 Materials Processing by Deformation.
MAE(MAT) 732 Fundamentals of Metal Machining Theory.
MAE 733 Finite Element Analysis I.
MAE 734 Finite Element Analysis II.
MAE 736 Photoelasticity.
MAE 737 Mechanics of Composite Structures.
MAE 740 Advanced Machine Design I.
MAE 741 Advanced Machine Design II.
MAE 742 Mechanical Design for Automated Assembly.
MAE 743 Fracture Mechanics.
MAE 744 Real Time Robotics.
MAE 745 Advanced Flight Vehicle Stability and Control.
MAE 746 Inertial Navigation Analysis and Design.
MAE 750 Foundations of Fluid Dynamics.
MAE 751 Airfoil Theory.
MAE 752 Transonic Aerodynamics.
MAE 753 Compressible Fluid Flow.
MAE 754 Hypersonic Aerodynamics.
MAE 755 Aerodynamic Heating.
MAE 756 Mechanics of Ideal Fluids.
MAE 760 Computational Fluid Mechanics and Heat Transfer.
MAE 761 Wing Theory.
MAE 762 Physical Gas Dynamics.
MAE 766 Computational Fluid Dynamics.
MAE(MEA) 768, 769 Perturbation Method in Fluid Mechanics I, II.
MAE 770 Computation of Reacting Flows.
MAE 773 Hydrodynamic Stability and Transition.
MAE 774 Dynamics of Real Fluids I.
MAE 775 Dynamics of Real Fluids II.
MAE 776 Turbulence.
MAE 777 Experimental Methods in Fluid Mechanics.
MAE 778 Molecular Gas Dynamics I.
MAE 779 Molecular Gas Dynamics II.
MAE 789 Advanced Topics in Mechanical Engineering.
MAE 801 Seminar.
MAE 885 Doctoral Supervised Teaching.
MAE 890 Doctoral Preliminary Examination.
MAE 893 Doctoral Supervised Research.
MAE 895 Doctoral Dissertation Research.
MAE 899 Doctoral Dissertation Preparation.

Microbiology

Degrees Offered: Ph.D., M.S., Master of Microbiology

GRADUATE FACULTY

Professor H. M. Hassan, *Head of the Department*

Professor W. J. Dobrogosz, *Director of Graduate Programs*

Box 7615, (919) 515-2391, Fax: (919) 515-7867, micro@mbio.ncsu.edu

Professors: G. H. Luginbuhl, J. M. Mackenzie Jr., L. W. Parks; *Professor (USDA):* P. E. Bishop; *Adjunct Professors:* I. A. Casas, R. E. Kanich, T. Melton, K. G. Tatchell, S. R. Tove; *Professors Emeriti:* G. H. Elkan, J. J. Perry; *Associate Professors:* S. M. Laster, E. S. Miller, I. T. D. Petty; *Adjunct Associate Professors:* K. T. Kleeman; *Assistant Professors:* J. W. Brown, S. J. Libby; *Adjunct Assistant Professors:* W. M. Casey, W. S. Dallas, S. H. Shore

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: P. M. Foegeding, F. J. Fuller, T. R. Klaenhammer, W. E. Kloos, P. E. Orndorff, J. C. H. Shih; *Associate Professor:* B. Sherry; *Associate Professor (USDA):* R. G. Upchurch

The Department of Microbiology is in the College of Agriculture and Life Sciences and has a unique blend of applied and basic research programs. The department offers courses of study and research leading to the Ph.D., M.S. and Master of Microbiology degrees. The graduate program is designed to prepare individuals for careers in academic, industrial or research institute settings. Research in the department emphasizes study of fundamental biological processes, with several programs having important biotechnological, environmental and medical applications.

Admission Requirements: Applications are invited from individuals holding B.S. or M.S. degrees in the physical and life sciences. Applications should ideally be received in the department before January 15 to be considered for Fall semester admission. A written statement should describe the applicant's academic and career goals as well as their area of interest.

Master's Degree Requirements: The M.S. is a research-oriented degree requiring 30 credit hours and a written thesis. For students wishing a more general educational background in microbiology without the thesis requirement, the Master of Microbiology degree is offered. A first-year core curriculum is required for all master's degree students. At least one semester of laboratory instructorship is required.

Doctoral Degree Requirements: The Ph.D. program is designed for individuals desiring to pursue careers in research and teaching. Students enroll in a core curriculum consisting of courses in metabolic regulation/physiology, virology, immunology and molecular genetics. In addition, the student, in consultation with and approval by his/her advisory committee, may select elective courses offered by the Department of Microbiology and by other departments on campus. In conjunction with the advisor, the student establishes a four-member faculty advisory committee to guide the research and academic program. At least two semesters of laboratory instructorship is required. The final examination also includes a seminar presented by the candidate that is open to the university community.

Student Financial Support: Financial support for study in the department is available in the form of teaching assistantships, research assistantships and competitive fellowships. All applications to the department are automatically considered for available assistantships. For highly qualified students, supplemental funds are frequently available.

Other Relevant Information: During the first semester, participation in the laboratory rotation program is required so that students become acquainted with departmental research programs, faculty and other graduate students. A faculty thesis advisor and laboratory research program are usually selected in the first semester and no later than the second term.

GRADUATE COURSES

MB(BO,PP) 501 Fungi and Their Interaction with Plants.

MB(PP) 503 Bacteria and Their Interactions with Plants.

MB(ZO) 555 Protozoology.

MB 601 Seminar.

MB 620 Special Problems.

MB 624 Topical Problems.

MB 670 Master's Laboratory Rotations.

MB 680 Master's Microbiology Research Presentations.

MB 685 Master's Supervised Teaching.

MB 686 Teaching Experience.

MB 690 Master's Examination.

MB 693 Master's Supervised Research.

MB 695 Master's Thesis Research.

MB 699 Master's Thesis Preparation.

MB 703 Microbial Diversity.

MB 705 Biological Scanning Electron Microscopy.

MB 710 Biological Transmission Electron Microscopy.
 MB 711 Ultramicrotomy for Life Sciences.
 MB 714 Microbial Metabolic Regulation.
 MB 718 Introductory Virology.
 MB(FS) 725 Fermentation Microbiology.
 MB(BO,GN,PP) 730 Fungal Genetics and Physiology.
 MB(SSC) 732 Soil Microbiology.
 MB(IMM) 751 Immunology.
 MB(CBS,IMM,PHY,PO) 756 Immunogenetics.
 MB(GN) 758 Prokaryotic Molecular Genetics.
 MB(GN) 760 Experimental Microbial Genetics.
 MB 771 Molecular Virology of Animal Viruses.
 MB(BO) 774 Phycology.
 MB(BO,PP) 775 The Fungi.
 MB(BO,PP) 776 The Fungi - Lab.
 MB(CBS) 783 Advanced Immunology.
 MB 801 Seminar.
 MB 820 Special Problems.
 MB 824 Topcial Problems.
 MB 870 Doctoral Laboratory Rotations.
 MB 880 Doctoral Microbiology Research Presentations.
 MB 885 Doctoral Supervised Teaching.
 MB 886 Teaching Experience.
 MB 890 Doctoral Preliminary Examination.
 MB 893 Doctoral Supervised Research.
 MB 895 Doctoral Dissertation Research.
 MB 899 Doctoral Dissertation Preparation.

Middle Grades Education

For a listing of graduate faculty and program information, see curriculum and instruction.

Natural Resources

Degrees Offered: M.S., Master of Natural Resources

GRADUATE FACULTY

Professor D. L. Holley Jr., Director of Graduate Programs, Forestry
Box 8002, (919) 515-2892

Associate Professor B. E. Wilson, Director of Graduate Programs, Parks, Recreation and Tourism Management
Box 8004, (919) 515-3276

Professor C. D. Raper, Director of Graduate Programs, Soil Science
Box 7619, (919) 515-2643

Professors: F. W. Cabbage, H. A. Devine, H. J. Kleiss, J. D. Wellman; *Associate Professors:* R. C. Abt, J. D. Gregory, L. D. Gustke, R. L. Moore; *Associate Professor (USDA):* J. E. De Steiguer

The natural resources program is an interdepartmental program designed to prepare students for administrative positions in both private and public natural resource organizations. A core curriculum of 15 credit hours provides all NR students with courses in administration, economics, policy, statistics and current natural resource issues. For the remaining 17 credits, students elect a technical option administered by one of the three participating departments. A total of five technical options are currently approved. Two are in the Department of Forestry (forest policy and management, hydrology); two are in the Department of Parks, Recreation and Tourism Management (outdoor recreation management, spatial information systems) and one is in the Department of Soil Science (soil science). With one exception, each option is available as either the M.S. in NR or as the non-thesis Master of NR. The Soil Science Option is available only as the non-thesis degree.

Admissions Requirements: Students should have an undergraduate degree in natural resources or a related field. Experience in natural resources management and administration will be considered in lieu of an appropriate undergraduate degree. Admission is contingent upon acceptance by an advisor.

Master's Requirements: The M.S. degree requires a research thesis based on completion of a research project. The Master of NR degree requires a practical project which develops and demonstrates problem-solving skills.

Core Courses (15 credit hours)

ECG 515 Environmental and Resource Policy Or EC(ARE) 436 Environmental Economics.

FOR 742 Current Issues in Natural Resource Policy.

PA 500 Public Administration Or PA 511 Public Policy Analysis.

ST 501 Experimental Statistics for Biological Science I Or a higher level statistics course.

Nuclear Engineering

Degrees Offered: Ph.D., M.S., Master of Nuclear Engineering

GRADUATE FACULTY

Professor D. J. Dudziak, *Head of the Department*

Professor K. Verghese, *Director of Graduate Programs*

Box 7909, (919) 515-2301, verghese@ncsu.edu

Graduate Alumni Distinguished Professor: R. P. Gardner

Professors: M. A. Bourham, R. P. Gardner, J. G. Gilligan, K. L. Murty, P. J. Turinsky; *Adjunct Professors:* R. A. Gerwin, M. S. Wechsler; *Professors Emeriti:* R. L. Murray, R. F. Saxe, E. Stam, L. R. Zumwalt; *Associate Professors:* J. M. Doster, C. W. Mayo, R. M. Mayo; *Adjunct Associate Professors:* Y. R. Azmy, A. Hassanein; *Assistant Professors:* O. E. Hankins, M. Yim; *Adjunct Assistant Professors:* D. J. Kropaczek, E. D. Sills

The discipline of nuclear engineering is concerned with the development of nuclear processes for energy production and with the applications of radiation for the benefit of society. Representative topics of investigation include analytic, computational and experimental research in the neutronics, materials, thermal-hydraulics and control aspects of fission reactors; radiation detection and measurement of basic physics parameters; waste management and radiological assessment; applications of radioisotopes and radiation in industry, medicine and science; and plasma, plasma-material surface interactions and design aspects of fusion reactors.

Admission Requirements: Bachelor's degree graduates in any of the fields of engineering or physical sciences may be qualified for successful advanced study in nuclear engineering. Prior experience or course work in nuclear physics, partial differential equations and basic reactor analysis is helpful but may be gained during the first semester of graduate study. GRE scores (general test) are usually needed for financial aid.

Master's Degree Requirements: A project is required for the MNE degree. A minor (9 semester hours) must be selected for both the M.S. and MNE degrees.

Doctoral Degree Requirements: Students must pass a departmental qualifying exam that covers basic nuclear engineering material. Students must select a minor (typically 15-18 hours).

Student Financial Support: Teaching assistantships, research assistantships and fellowships are available for qualified applicants. Opportunities are also available for graduate traineeships with utility companies, reactor manufacturers and national laboratories providing a valuable combination of financial support and learning in the classroom, the research laboratory and on the job.

Other Relevant Information: The department has many excellent facilities including the one-megawatt PULSTAR fission reactor, the Scaled PWR Facility (SPWRF), neutron activation analysis laboratory, nuclear materials laboratory, plasma and fusion laboratories, instrumentation and controls equipment, radiation analyzers and tomography systems, and computers ranging from workstations to a supercomputer.

GRADUATE COURSES

NE 504 Radiation, Safety and Shielding.

NE 505 Reactor Systems.

NE 508 Radiation Safety.

NE(PY) 511 Nuclear Physics for Engineers.

NE 512 Nuclear Fuel Cycles.

NE 520 Radiation and Reactor Fundamentals.

NE(PY) 528 Introduction to Plasma Physics and Fusion Energy.

NE 585 Hazardous Waste Management.

NE 591, 592 Special Topics in Nuclear Engineering I, II.

NE 601 Seminar.

NE 685 Master's Supervised Teaching.

NE 690 Master's Examination.

NE 693 Master's Supervised Research.

NE 695 Master's Thesis Research.

NE 699 Master's Thesis Preparation.

NE 721 Nuclear Laboratory Fundamentals.

NE 722 Reactor Dynamics and Control.

NE 723 Reactor Analysis.

NE 724 Reactor Heat Transfer.

NE(MAT) 725 Nuclear Materials.

NE 726 Radioisotope Measurement Applications.

NE 727 Nuclear Engineering Analysis.

NE 740 Laboratory Projects in Nuclear Engineering.
 NE 745 Plasma Generation and Diagnostics Laboratory.
 NE 746 Fusion Energy Engineering.
 NE 750 Laboratory Projects in Nuclear Engineering.
 NE 751 Nuclear Reactor Design Calculations.
 NE 752 Thermal Hydraulic Design Calculations.
 NE 753 Reactor Kinetics and Control.
 NE 755 Reactor Theory and Analysis.
 NE 757 Radiation Effects on Materials.
 NE 761 Radiation Detection.
 NE 762 Radioisotope Applications.
 NE 770 Nuclear Radiation Attenuation.
 NE(MAT) 773 Computer Experiments in Materials and Nuclear Engineering.
 NE(MA) 777 Exact and Approximate Solutions in Particle Transport Theory.
 NE 780 Plasma Engineering I.
 NE 781 Plasma Engineering II.
 NE 795, 796 Advanced Topics in Nuclear Engineering I, II.
 NE 801 Seminar.
 NE 885 Doctoral Supervised Teaching.
 NE 890 Doctoral Preliminary Examination.
 NE 893 Doctoral Supervised Research.
 NE 895 Doctoral Dissertation Research.
 NE 899 Doctoral Dissertation Preparation.

Nutrition

Degrees Offered: Ph.D., M.S., Master of Nutrition

GRADUATE FACULTY

Professor J. C. Allen, Coordinator

Box 7624, (919) 515-2968

Professors: J. T. Brake, L. S. Bull, G. L. Catignani, W. J. Croom, W. E. Donaldson, J. D. Garlich, W. M. Hagler Jr., C. J. Lackey, J. W. McClelland, J. F. Ort, J. C. H. Shih, R. C. Smart, J. W. Spears, H. E. Swaisgood, L. W. Whitlow; *Professors Emeriti:* L. W. Aurand, E. R. Barrick, E. S. Cofer, R. W. Harvey, C. H. Hill, W. L. Johnson, E. E. Jones, J. R. Jones, R. D. Mochrie, A. H. Rakes, H. A. Ramsey, F. H. Smith, G. H. Wise; *Associate Professors:* B. P. Alston-Mills, K. E. Anderson, L. C. Boyd, J. H. Eisemann, P. R. Ferket, J. L. Grimes, B. A. Hopkins, J. Odle, M. H. Poore; *Visiting Associate Professor:* G. G.

Gomez; *Assistant Professors*: R. J. Harrell, G. B. Huntington, J.-M. Luginbuhl, E. Van Heugten, C. M. Williams; *Visiting Assistant Professors*: S. L. Ash, J. A. Moore

The interdepartmental nutrition program consist of faculty from five departments (animal science, family and consumer sciences, food science, poultry science and toxicology). Students reside and conduct research in one of these departments under the direction of an appropriate advisor. Research in the nutrition program may be conducted with a variety of species and at levels ranging from the molecular to the whole animal. Research programs are primarily in the area of nutritional biochemistry or experimental animal nutrition.

Admission Requirement: To be considered for admission, a student should have a B.S. or M.S degree in a science-related area.

Master's Degree Requirements: A minimum of 24 course credit hours is required.

Student Financial Support: Assistantships and fellowships are available on a competitive basis from the departments in which the advisor resides.

GRADUATE COURSES

NTR(ANS) 516 Animal Nutrition Research Methods.

NTR 601 Master's Seminar.

NTR 624 Topical Problems.

NTR 625 Advanced Special Problems.

NTR 685 Master's Supervised Teaching.

NTR 690 Master's Examination.

NTR 693 Master's Supervised Research.

NTR 695 Master's Thesis Research.

NTR 699 Master's Thesis Preparation.

NTR 701 Protein and Amino Acid Metabolism.

NTR(FS) 706 Vitamin Metabolism.

NTR 708 Energy Metabolism.

NTR(FS) 730 Human Nutrition.

NTR(ANS,CBS,PHY) 764 Comparative Physiology of Digestive Systems.

NTR(ANS,PO) 775 Mineral Metabolism.

NTR 801 Doctoral Seminar.

NTR 824 Topical Problems.

NTR 825 Advanced Special Problems.

NTR 885 Doctoral Supervised Teaching.

NTR 890 Doctoral Preliminary Examination.

NTR 893 Doctoral Supervised Research.
NTR 895 Doctoral Dissertation Research.
NTR 899 Doctoral Dissertation Preparation.

Occupational Education

For a listing of graduate faculty and program information, see mathematics and science education.

Operations Research

Degrees Offered: Ph.D., M.S., Master of Operations Research

GRADUATE FACULTY

Professor W. J. Stewart, ***Chair and Program Director***

Box 7913, (919) 515-2350, Fax: (919) 513-1908, billy@csc.ncsu.edu

Professors: R. H. Bernhard, B. B. Bhattacharyya, J. W. Bishir, S. L. Campbell, W. Chou, H. A. Devine, J. C. Dunn, S. E. Elmaghraby, S. Fang, R. E. Funderlic, R. E. Hartwig, T. J. Hodgson, D. M. Holthausen Jr., C. T. Kelley, R. E. King, C. J. Maday, C. D. Meyer Jr., D. F. McAllister, A. A. J. Nilsson, H. L. Nuttle, H. G. Perros, E. L. Peterson, S. D. Roberts, C. D. Savage, L. A. Stefanski, M. W. Suh, M. A. Vouk, J. R. Wilson; ***Professors Emeriti:*** H. J. Gold, N. J. Rose; ***Associate Professors:*** Y. Fathi, T. L. Honeycutt, J. C. Lu, T. W. Reiland, J. Rodriguez, J. P. Roise, C. E. Smith, M. F. M. Stallmann, H. T. Tran, I. Viniotis; ***Assistant Professors:*** H. Damerdj, W. M. McEneaney, G. N. Rouskas

Operations research is a graduate program of an interdisciplinary nature, governed by an administrative board and the program committee, and administered through the office of the program director.

Admission Requirements: Applications for a master's degree program are accepted normally from undergraduate majors in mathematical sciences and engineering. Applications for the doctoral degree program are accepted normally from holders of a master's degree from a recognized program (preferably an OR program or one of its allied fields) who show promise of success at the Ph.D. level, as indicated by previous academic performance and independent research.

A score on the GRE that is less than two years old is required if financial assistance is sought or if the student is transferring from another doctoral program.

Master's Degree Requirements: The Master of Operations Research degree is a terminal graduate degree for students who seek careers as OR practitioners in either the private or public sector. The M.S. degree is designed to prepare students for careers in research and development.

Doctoral Degree Requirements: The Ph.D. degree is intended for students to be research scientists in industry or teachers and researchers in academia. Please consult the OR brochure for more details of degree requirements.

Student Financial Support: Both teaching and research assistantships are available to qualified applicants. Outstanding students who are U.S. citizens and who shall be enrolled in the NC State Graduate School for the first time are eligible for the Engineering Dean's Graduate Fellowship Program.

CENTRAL GRADUATE COURSES

- OR 501 Introduction to Operations Research.
- OR 502 Introduction to Systems Theory.
- OR(MA) 504 Introduction to Mathematical Programming.
- OR(IE,MA) 505 Linear Programming.
- OR 506 Algorithmic Methods in Nonlinear Programming.
- OR(CHE) 527 Optimization of Engineering Processes.
- OR(E,MA) 531 Dynamic Systems and Multivariable Control I.
- OR(CSC,MA) 565 Graph Theory.
- OR 591 Special Topics.
- OR 601 Seminar.
- OR 610 Special Topics.
- OR 615 Advanced Special Topics
- OR 652 Practicum in Operations Research.
- OR 685 Master's Supervised Teaching.
- OR 690 Master's Examination.
- OR 693 Master's Supervised Research.
- OR 695 Master's Thesis Research.
- OR 699 Master's Thesis Preparation.
- OR 705 Large Scale Linear Programming Systems.
- OR(MA,ST) 706 Nonlinear Programming.
- OR(MA) 708 Integer Programming.
- OR(IE) 709 Dynamic Programming.
- OR 710 Advanced Dynamic Programming.
- OR(MA) 719 Vector Space Methods in System Optimization.
- OR 720 Theory of Activity Networks.
- OR(BMA,ST) 722 Decision Analytic Modeling.
- OR(E,MA) 731 Dynamic Systems and Multivariable Control II.

OR(IE) 761 Queues and Stochastic Service Systems.
 OR(CSC,ECE,IE) 762 Computer Simulation Techniques.
 OR(IE,MA) 766 Network Flows.
 OR(IE) 772 Stochastic Simulation Design and Analysis.
 OR(BMA,MA,ST) 773 Stochastic Modeling.
 OR(BMA) 774 System Modeling Theory.
 OR(IE,MA) 790 Advanced Special Topics in Systems Analysis and Optimization.
 OR 791 Advanced Special Topics.
 OR 801 Seminar.
 OR 810 Special Topics.
 OR(IE,MA) 812 Special Topics in Mathematical Programming.
 OR 815 Advanced Special Topics.
 OR(IE,MA) 816 Advanced Special Topics in System Optimization.
 OR 852 Practicum in Operations Research.
 OR(IE) 862 Scheduling and Routing.
 OR 885 Doctoral Supervised Teaching.
 OR 890 Doctoral Preliminary Examination.
 OR 893 Doctoral Supervised Research.
 OR 895 Doctoral Dissertation Research.
 OR 899 Doctoral Dissertation Preparation.

SUGGESTED COGNATE COURSES

Cognate courses are courses that are often included in OR programs of study, but which carry other departmental designations. They cover subject matter closely related to OR, and provide additional insight into the theory or application of OR methodology. Students may include cognate courses in their programs of study with the consent of their faculty advisor.

BMA(MA,ST) 771, 772 Biomathematics I, II.
 CSC 505 Design and Analysis of Algorithms.
 CSC(MA) 580 Numerical Analysis I.
 CSC(ECE) 779 Advanced Computer Performance Modelling.
 CSC(MA) 780 Numerical Analysis II.
 ECE 521 Digital Computer Technology and Design.
 ECE 716 Feedback Control Systems.
 ECG 750 Economic Decision Theory.
 ECG(ST) 751 Econometrics.
 ECG(ST) 752 Topics in Econometrics.
 IE 723 Production Planning, Scheduling and Inventory Control.
 IE 747 Reliability Engineering.
 IE 748 Quality Engineering.
 MA 523 Linear Transformations and Matrix Theory.
 MA(ST) 546 Theory of Probability.

MA 715 Functional Analysis I.
 MA 723 Theory of Matrices and Applications.
 MA(ST) 746 Introduction to Stochastic Processes.
 MA(ST) 778, 779 Measure Theory and Advanced Probability.
 MA 798 Special Topics in Numerical Analysis.
 ST 730 Applied Time Series Analysis.
 ST 782, 783 Time Series Analysis I, II.
 ST 785 Introduction to Statistical Decision Theory.

Parks, Recreation and Tourism Management

Degrees Offered: M.S., Master of Parks, Recreation and Tourism Management, Master of Natural Resources

GRADUATE FACULTY

Professor P. S. Rea, *Head of the Department*
Associate Professor B. E. Wilson, *Director of Graduate Programs*
 Box 8004, (919) 515-3276

Professors: H. A. Devine, C. D. Siderelis, M. R. Warren Jr., J. D. Wellman;
Professors Emeriti: T. I. Hines, W. E. Smith, R. E. Sternloff; *Associate Professors:* A. Attarian, G. L. Brothers, L. D. Gustke, S. L. Kirsch, C. S. Love, R. L. Moore, C. G. Vick; *Adjunct Associate Professor:* H. K. Cordell; *Associate Professors Emeriti:* G. A. Hammon, L. L. Miller; *Assistant Professor:* M. A. Kanters; *Adjunct Assistant Professors:* R. A. Robinson

The master's degree provides students the opportunity to develop and enhance their critical understanding of both the conceptual foundations of parks, recreation and tourism management and the procedures of systematic inquiry and critical problem solving as applied to planning and management issues. The department offers educational opportunities and resources for the preparation of professionals concerned with planning, organizing, managing and directing parks, recreation and tourism programs, areas and facilities. The general emphasis areas at the master's level include: parks and recreation management, tourism development and management, geographic information systems, recreational sport management and natural resource recreation management.

Admissions Requirements: Scores from the GRE are required for admission.

Master's Degree Requirements: The M.S. degree requires 30 hours of course work, of which 4 hours is a master's thesis. The M.PRT. requires a minimum of 36 hours of course work, of which 2 hours is a master's research project. A minor is optional

with both degrees. The department offers a co-major with public administration which includes 41 hours of course work. The M.N.R. degree requires a minimum of 30-33 hours.

Student Financial Support: Graduate assistantships and internships are available to students in this program on a competitive basis.

GRADUATE COURSES

PRT 500 Theories of Leisure and Recreation.

PRT 501 Research Methods in Recreation.

PRT(ECG) 503 Economics of Recreation.

PRT 504 Recreation and Park Data Systems.

PRT 505 Quantitative Techniques for Recreation and Natural Resource Management.

PRT 510 Theories of Sport and Fitness Program Management.

PRT 511 Foundations for Sport, Exercise and Fitness Program Management.

PRT 512 Recreational Sport Management.

PRT 520 Concepts of Travel and Tourism.

PRT 550 Outdoor Recreation Behavior.

PRT 562 Introduction to Geographic Information Systems.

PRT 563 Technical Issues in Geographic Information Systems.

PRT 580 Current Issues in Recreation Resources.

PRT 601 Seminar.

PRT 602 Recreation Management Seminar I.

PRT 603 Recreation Management Seminar II.

PRT 610 Special Topics.

PRT 620 Special Problems.

PRT 625 Advanced Problems.

PRT 660 Field Studies in Recreation.

PRT 685 Master's Supervised Teaching.

PRT 690 Master's Examination.

PRT 693 Master's Supervised Research.

PRT 695 Master's Thesis Research.

PRT 699 Master's Thesis Preparation.

PRT 763 Application Issues in Geographic Information Systems.

PRT 764 Advanced Study in Geographic Information Systems.

Physics

Degrees Offered: Ph.D., M.S.

GRADUATE FACULTY

Professor C. R. Gould, Head of the Department

Professor M. A. Paesler, Director of Graduate Programs

Box 8202, (919) 515-8706

Graduate Alumni Distinguished Professor: G. E. Mitchell

University Professor: G. Lucovsky

Professors: D. E. Aspnes, J. Bernholc, K. T. Chung, J. W. Cook Jr., S. R. Cotanch, D. C. Ellison, R. E. Fornes, D. G. Haase, C. Ji, C. E. Johnson, K. L. Johnston, G. H. Katzin, F. Lado Jr., J. D. Memory, G. E. Mitchell, J. R. Mowat, R. J. Nemanich, J. Y. Park, R. R. Patty, S. P. Reynolds, J. S. Risley, D. E. Sayers, J. F. Schetzina, P. J. Stiles, D. R. Tilley; *Visiting Professor:* J. L. Hubisz; *Adjunct Professors:* R. V. Janssens, J. E. Rowe, J. F. Wilkerson; *Professors Emeriti:* W. R. Davis, W. O. Doggett, G. L. Hall, A. W. Jenkins Jr., E. R. Manring, L. W. Seagondollar; *Associate Professors:* H. W. Ade, R. Beichner, J. M. Blondin, G. C. Cobb, Jr., M. A. Klenin, G. W. Parker III, C. M. Roland; *Adjunct Associate Professor:* J. F. Shriner Jr.; *Assistant Professors:* J. D. Brown, H. Hallen, E. F. Moore, E. S. Swanson; *Research Assistant Professor:* N. Dietz; *Adjunct Assistant Professor:* L. S. Plano

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: J. M. Danby, R. M. Kolbas, J. Narayan, D. L. Ridgeway, E. C. Theil; *Associate Professor:* L. K. Norris

Research opportunities are available in the following areas: astrophysics, atomic and molecular physics, condensed matter physics, nuclear physics and physics education.

Admission Requirements: Bachelor's degree in Physics (or the equivalent) and the GRE Advanced test in physics.

Doctoral Degree Requirements: Six semesters beyond the baccalaureate; core physics courses PY 721, 781, 782, 783, 785, 786.

Student Financial Support: Graduate teaching assistantships are available for new and continuing students; research assistantships are normally available only to continuing students.

GRADUATE COURSES

- PY 506 Nuclear and Subatomic Physics.**
- PY 507 Elementary Particle Physics.**
- PY 508 Ion and Electron Physics.**
- PY 509 Plasma Physics.**
- PY(NE) 511 Nuclear Physics for Engineers.**
- PY 516 Physical Optics.**
- PY 517 Atomic and Molecular Physics.**
- PY 525 Computational Physics.**
- PY(NE) 528 Introduction to Plasma Physics and Fusion Energy.**
- PY 543 Astrophysics.**
- PY(ECE) 552 Introduction to the Structure of Solids.**
- PY 561 Electronics for Physicists.**
- PY(MA) 575 Mathematical Introduction to Celestial Mechanics.**
- PY(MA) 576 Orbital Mechanics.**
- PY 601 Seminar.**
- PY 610 Special Topics.**
- PY 615 Advanced Special Topics.**
- PY 660 Advanced Placement Physics for Secondary School Teachers.**
- PY 685 Master's Supervised Teaching.**
- PY 693 Master's Supervised Research.**
- PY 695 Master's Thesis Research.**
- PY 699 Master's Thesis Preparation.**
- PY 711 Advanced Quantum Mechanics I.**
- PY 712 Advanced Quantum Mechanics II.**
- PY 721 Statistical Physics I.**
- PY 722 Statistical Physics II.**
- PY(ECE) 727 Semiconductor Thin Films Technology.**
- PY 730 Nuclear Structure Physics I.**
- PY 753 Introduction to the Structure of Solids II.**
- PY 754 Properties of Surfaces and Interfaces.**
- PY 781, 782 Quantum Mechanics I, II.**
- PY 783 Advanced Classical Mechanics I.**
- PY 785, 786 Advanced Electricity and Magnetism I, II.**
- PY 801 Seminar.**
- PY 810 Special Topics.**
- PY 815 Advanced Special Topics.**
- PY 860 Advanced Placement Physics for Secondary School Teachers.**
- PY 885 Doctoral Supervised Teaching.**
- PY 890 Doctoral Preliminary Examination.**

PY 893 Doctoral Supervised Research.
PY 895 Doctoral Dissertation Research.
PY 899 Doctoral Dissertation Preparation.

Physiology

Degrees Offered: Ph.D., M.S., Master of Physiology

GRADUATE FACULTY

Associate Professor J. E. Gadsby, *Coordinator*
Box 8401, (919) 829-4448

Professors: R. A. Argenzio, G. T. Barthalmus, B. L. Black, J. T. Brake, J. H. Britt, E. V. Caruolo, V. L. Christensen, W. J. Croom Jr., F. W. Edens, K. L. Esbenshade, H. F. Heatwole, T. E. LeVere, N. C. Olson, W. D. Oxender, R. M. Petters, M. A. Qureshi, J. F. Roberts, M. C. Roberts, R. M. Roe, T. D. Siopes, C. Teng, H. A. Underwood Jr., T. G. Wolcott; *Professors Emeriti:* C. H. Hill, D. E. Smith, L. C. Ulberg; *Associate Professors:* G. W. Almond, B. P. Alston-Mills, H. M. Berschneider, B. A. Breuhaus, C. E. Farin, W. L. Flowers, R. M. Grossfeld, S. L. Pardue, J. N. Petite, C. V. Sullivan, S. P. Washburn, M. D. Whitacre; *Assistant Professors:* R. J. Borski, G. S. Davis, P. W. Farin, S. L. Vivrette

The physiology faculty is an interdepartmental group drawn from the departments participating in the program. These departments include animal science, biochemistry, entomology, food animal and equine medicine, poultry science, psychology, veterinary anatomy, physiological sciences and radiology, and zoology. The program emphasizes the comparative approach implicit in this type of organization and is designed to prepare individuals for careers in research and teaching. Experimental animals available cover a wide range, from insects and other invertebrates to large mammals.

Admission Requirements: Students entering the graduate program in physiology should have a bachelor's degree in a related biological or physical science. Undergraduate courses should include physiology, biochemistry, organic chemistry, calculus and physics. The Aptitude Test of the Graduate Record Examination is required, and the Advanced Tests in biology and chemistry are desirable.

Master's Degree Requirements: On average, the M.S. degree requires two to three years.

Doctoral Degree Requirements: On average, completion of the Ph.D. degree requires five years.

Student Financial Support: Financial assistance for qualified students in the form of research assistantships, fellowships and traineeships is available through participating departments.

Other Relevant Information: The physiology program is jointly administered by the Colleges of Agriculture and Life Sciences and Veterinary Medicine. Graduate students enrolled as physiology majors are located in the department of their major professor and may participate in departmental activities.

GRADUATE COURSES

PHY(ZO) 503 General Physiology I.

PHY(ZO) 504 General Physiology II.

PHY(ZO) 513 Comparative Physiology.

PHY 601 Seminar.

PHY(ZO) 602 Seminar in Biology of Reproduction.

PHY 610 Selected Topics.

PHY 620 Special Problems.

PHY 685 Master's Supervised Teaching.

PHY 690 Master's Examination.

PHY 693 Master's Supervised Research.

PHY 695 Master's Thesis Research.

PHY 699 Master's Thesis Preparation.

PHY(ANS) 702 Reproductive Physiology of Mammals.

PHY(PO,ZO) 724 Comparative Endocrinology.

PHY(CBS,IMM,MB,PO) 756 Immunogenetics.

PHY(ANS,NTR) 764 Comparative Physiology of the Digestive System.

PHY(ANS) 780 Mammalian Endocrinology.

PHY 801 Seminar.

PHY(ANS,CBS,ZO) 802 Seminar in Biology of Reproduction.

PHY 810 Selected Topics.

PHY 820 Special Problems.

PHY 885 Doctoral Supervised Teaching.

PHY 890 Doctoral Preliminary Examination.

PHY 893 Doctoral Supervised Research.

PHY 895 Doctoral Dissertation Research.

PHY 899 Doctoral Dissertation Preparation.

OTHER SUPPORTING COURSES AVAILABLE

Other supporting course are available in biochemistry, biomathematics, biotechnology, cell biology, comparative biomedical sciences, entomology, genetics, immunology, microbiology, nutrition, pharmacology, poultry science, psychology, statistics, toxicology and zoology. Certain courses on the interface between physiology and engineering may be taken after consultation with advisor and the instructors concerned.

Plant Pathology

Degrees Offered: Ph.D., M.S., Master of Plant Pathology

GRADUATE FACULTY

Professor O. W. Barnett Jr., *Head of the Department*

(919) 515-2730

Professor D. M. Benson, *Director of Graduate Programs*

(919) 515-3966, Box 7616, Fax: (919) 515-5657, mike_benson@ncsu.edu

Philip Morris Professor: T. A. Melton III

Professors: J. E. Bailey, K. R. Barker, R. I. Bruck, C. L. Campbell, M. E. Daub, L. F. Grand, J. Huang, R. K. Jones, S. A. Lommel, C. E. Main, R. D. Milholland, J. W. Moyer, G. A. Payne, J. B. Ristaino, D. F. Ritchie, R. C. Rufty, H. D. Shew, P. B. Shoemaker, T. B. Sutton, C. G. Van Dyke; *Professors (USDA):* A. S. Heagle, S. Leath, R. A. Reinert; *Visiting Professor:* C. S. Hodges Jr.; *Professors Emeriti:* J. L. Apple, C. W. Averre III, R. Aycock, D. F. Bateman, M. K. Beute, C. N. Clayton, C. B. Davey, G. V. Gooding, Jr., L. T. Lucas, N. T. Powell, J. P. Ross, J. N. Sasser, H. W. Spurr Jr., D. L. Strider, H. H. Triantaphyllou, J. C. Wells, N. N. Winstead; *Associate Professors:* D. M. Bird B. C. Haning, P. B. Lindgren, C. H. Opperman; *Associate Professors (USDA):* M. L. Carson, S. R. Shafer, R. G. Upchurch; *Assistant Professors:* M. Cubeta, E. L. Davis, G. J. Holmes, F. J. Louws

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: E. B. Cowling, W. M. Hagler Jr.; *Associate Professors:* M. A. Conkling, C. L. Hemenway

Plant pathology is committed to solving plant disease problems with research that focuses on plant-pathogen interactions at the genomic, cellular, organismal and ecological levels. Approaches include disease management, epidemiology, molecular

biology and host-parasite interactions. Focus areas are bacteriology, mycology, nematology, virology, soil-borne pathogens and mechanisms of pathogenesis.

Admission Requirements: The general application procedures of the Graduate School noted at the beginning of this section are followed. Normally domestic, but not international, applicants are required to submit GRE results. A detailed statement of applicant interests and goals in plant pathology is most useful to the admissions committee.

Master's Degree Requirements: Required courses include: PP 501 Fungi and Their Interaction with Plants, PP(CS,HS) 502 Plant Disease: Methods and Diagnosis, PP(MB) 503 Bacteria and Their Interactions with Plants, PP 504 Plant Nematology, PP 505 Introductory Plant Virology and PP 506 Epidemiology and Plant Disease Control. In addition, students take PP 601 Seminar and one advanced course. Students serve as a teaching assistant for one course.

Doctoral Degree Requirements: A diagnostic examination prior to enrollment is used as a guide to course selection and to measure competency in the M.S. courses listed above. In addition, students take PP 809 Colloquium, PP 801 Seminar and two advanced courses. Students serve as a teaching assistant for two courses.

Student Financial Support: A limited number of one-half time assistantships are available on a competitive basis. Stipend levels for each degree are equivalent to those at comparable institutions. Out-of-state tuition waiver is available according to Graduate School guidelines. Applicants are considered for assistantship support at time of application. Special supplements to assistantships are available on a competitive basis for outstanding students.

Other Relevant Information: Fully equipped and staffed laboratories for research are available in addition to greenhouse facilities and environmental growth chambers in the phytotron. Special facilities for experimental work on diseases under field conditions are available at 16 locations throughout the state. Microcomputers, library, mycological herbarium, photography laboratory and interdepartmental electron microscopy center are additional features available in the department.

GRADUATE COURSES

PP 500 Plant Disease: Principles, Diagnosis and Management.

PP(BO,MB) 501 Fungi and Their Interaction with Plants.

PP(CS,HS) 502 Plant Disease: Methods and Diagnosis.

PP(MB) 503 Bacteria and Their Interactions with Plants.

PP 504 Plant Nematology.

PP 505 Introductory Plant Virology.

PP 506 Epidemiology and Plant Disease Control.
 PP 590 Special Topics.
 PP 601 Seminar.
 PP 610 Special Topics.
 PP 615 Advanced Special Topics.
 PP 620 Special Problems.
 PP 685 Master's Supervised Teaching.
 PP 690 Master's Examination.
 PP 693 Master's Supervised Research.
 PP 695 Master's Thesis Research.
 PP 699 Master's Thesis Preparation.
 PP 708 History of Phytopathology.
 PP 720 Morphology and Taxonomy of Nematodes.
 PP(BO) 721 Advanced Mycology.
 PP 724 Advanced Plant Nematology.
 PP 725 Molecular Biology of Plant Viruses.
 PP 726 Botanical Epidemiology.
 PP 728 Soilborne Plant Pathogens.
 PP 729 Plant Pathogenesis.
 PP(BO,GN,MB) 730 Fungal Genetics and Physiology.
 PP 732 Genetics of Host-Parasite Interactions.
 PP(CS,GN,HS) 748 Breeding for Pest Resistance.
 PP(BO,MB) 775 The Fungi.
 PP(BO,MB) 776 The Fungi-Lab.
 PP 790 Special Topics.
 PP 801 Seminar.
 PP 809 Colloquium in Plant Pathology.
 PP 810 Special Topics.
 PP 815 Advanced Special Topics.
 PP 820 Special Problems.
 PP 885 Doctoral Supervised Teaching.
 PP 890 Doctoral Preliminary Examination.
 PP 893 Doctoral Supervised Research.
 PP 895 Doctoral Dissertation Research.
 PP 899 Doctoral Dissertation Preparation.

Political Science

Degree Offered: M. A.

GRADUATE FACULTY

Assistant Professor A. J. Taylor, *Director of Graduate Program*
Box 8102, (919) 515-8618, taylor@social.chass.ncsu.edu

Professors: C. K. Coe, D. M. Daley, G. D. Garson, M. S. Soroos, D. W. Stewart, J. H. Svara, J. O. Williams; *Professors Emeriti:* W. J. Block, A. Holtzman, E. R. Rubin; *Associate Professors:* C. E. Griffin, S. H. Kessler, J. M. McClain, R. S. Moog, E. O'Sullivan, T. V. Reid, J. E. Swiss, M. L. Vasu; *Associate Professors Emeriti:* J. H. Gilbert, H. G. Kebschull, K. S. Petersen; *Assistant Professors:* M. A. Dimock, R. L. Korosec, R. F. Stephen; *Visiting Assistant Professors:* J. K. Davis, S. K. Straus

ASSOCIATE MEMBER OF THE PROGRAM

Associate Professor: P. W. Hamlett

The program is designed for students interested in careers in government service, international organizations, education or the private business sector. A typical course of study draws from the fields of political science, history, sociology and anthropology, and economics.

Admission Requirements: Applicants should submit GRE scores and a writing sample; those not meeting the minimum requirements for full admission should consult with the Director of Graduate Programs.

Master's Degree Requirements: Two options are offered. The thesis option requires a minimum 30 hours of course work, including a thesis. The non-thesis option requires a minimum of 36 hours of course work. In either option, students choose two major fields from American politics, comparative politics, international relations and public administration. Also required: a core course on political science, a research methodology course, reading proficiency in a modern foreign language or competence in a research skill, and nine to twelve hours of work outside the department.

Student Financial Support: A limited number of fellowships are awarded on a competitive basis.

Other Relevant Information: The methodology requirement should be fulfilled as soon as possible. Students may take courses at Duke or UNC-Chapel Hill on topics not offered by NC State.

GRADUATE COURSES

- PS 500 Contemporary Political Science.**
- PS 502 The Legislative Process.**
- PS 506 United States Constitutional Law.**
- PS 507 Civil Liberties in the United States.**
- PS 530 Seminar in International Relations.**
- PS 531 International Law.**
- PS 533 Global Problems and Policy.**
- PS 536 Global Environmental Law and Policy.**
- PS 539 International Political Economy.**
- PS 540 Seminar in Comparative Politics.**
- PS 542 Western European Politics.**
- PS 543 Latin American and Caribbean Politics.**
- PS 545 Comparative Systems of Law and Justice.**
- PS 571 Research Methods and Analysis.**
- PS 590 Special Topics.**
- PS 602 Seminar in International Relations.**
- PS 603 Seminar in Politics.**
- PS 610 Special Topics in Political Science.**
- PS 636 Readings and Research.**
- PS 651 Internship in Political Science.**
- PS 685 Master's Supervised Teaching.**
- PS 690 Master's Examination.**
- PS 693 Master's Supervised Research.**
- PS 695 Master's Thesis Research.**
- PS 699 Master's Thesis Preparation.**

Poultry Science

Degrees Offered: M.S., Master of Poultry Science

GRADUATE FACULTY

Professor G. B. Havenstein, Head of the Department
(919) 515-5555

Professor T. D. Siopes, Director of Graduate Programs
Box 7608, (919) 515-5535, tom_siopes@ncsu.edu

William Neal Reynolds Professor: W. E. Donaldson

Professors: J. T. Brake, T. A. Carter, V. L. Christensen, W. J. Croom Jr., F. W. Edens, J. D. Garlich, W. M. Hagler Jr., J. F. Ort, S. L. Pardue, C. R. Parkhurst, M. A. Qureshi, J. C. H. Shih, M. J. Wineland; **Adjunct Professors:** M. R. Bakst, W. L. Bryden, R. R. Dietert, K. K. Krueger, K. A. Schat; **Professors Emeriti:** E. W. Glazener, P. B. Hamilton, J. R. Harris, C. H. Hill; **Associate Professors:** K. E. Anderson, G. S. Davis, P. R. Ferket, J. L. Grimes, J. N. Petitte; **Adjunct Associate Professor:** W. E. Brown; **Assistant Professors:** D. K. Carver, C. M. Williams; **Adjunct Assistant Professor:** R. P. Gildersleeve

ASSOCIATE MEMBERS OF THE PROGRAM

Professor: R. W. Bottcher, B. W. Sheldon; **Associate Professor Emeritus:** H. R. Ball Jr.; **Associate Professors:** P. A. Curtis, D. P. Wages

Course offerings and research programs are comprehensive in the areas of physiology, nutrition, microbiology, molecular biology, immunology, genetics, pathology and toxicology. The demand for men and women with advanced training in poultry science is far greater than the supply. Opportunities exist for graduates in research and teaching in universities, government and private industry.

Admission Requirements: Exceptions to the minimum 3.00 undergraduate grade point average may be made for students with special backgrounds, abilities and interests.

Master's Degree Requirements: While there are no specific course requirements for the master's degree in poultry science, most programs exceed the minimum 30 credit hours.

Doctoral Degree Requirements: Doctoral degrees are offered only through interdepartmental programs in the disciplines of physiology, nutrition, genetics, toxicology, microbiology and immunology. Associated research is done with domestic birds in the Department of Poultry Science. Requirements are as given in the Graduate Catalogue. Application should be made directly to the specific discipline program.

Student Financial Support: Both research and teaching assistantships are available on a competitive basis within the department. General requirements for these assistantships are as described in the Graduate Catalogue. Other financial support may be available in the form of graduate stipend supplementation, out-of-state tuition waivers or research grant support.

Other Relevant Information: The Department of Poultry Science occupies new facilities in a three-story building adjacent to the main campus library. The department consists of about 25 faculty, a support staff of approximately 50, 20 to 30 graduate students and postdoctoral associates, and 70-100 undergraduate students.

GRADUATE COURSES

PO 601 Seminar.
PO 620 Special Problems.
PO 685 Master's Supervised Teaching.
PO 693 Master's Supervised Research.
PO 695 Master's Thesis Research.
PO 699 Master's Thesis Preparation.
PO 702 Biotechniques in Avian Biology.
PO 705 Physiological Aspects of Poultry Management.
PO(PHY,ZO) 724 Comparative Endocrinology.
PO(CBS,IMM,MB,PHY) 756 Immunogenetics.
PO(IMM) 757 Avian Immunology.
PO(ANS,NTR) 775 Mineral Metabolism.
PO 801 Seminar.
PO 820 Special Problems.
PO 885 Doctoral Supervised Teaching.
PO 893 Doctoral Supervised Research.
PO 895 Doctoral Dissertation Research.
PO 899 Doctoral Dissertation Preparation.

Psychology

Degrees Offered: Ph.D., M.S.

GRADUATE FACULTY

Professor D. W. Martin, Head of the Department
Associate Professor S. S. Snyder Jr., Director of Graduate Programs
Box 7801, (919) 515-2251, sam_snyder@ncsu.edu

Professors: J. W. Cunningham, D. W. Drewes, W. P. Erchul, T. M. Hess, J. W. Kalat, T. E. LeVere, J. E. R. Luginbuhl, D. H. Mershon, J. J. Michael, R. W. Nacoste, S. E. Newman, F. J. Smith, B. W. Westbrook; **Adjunct Professors:** J. L. Howard, W. E. Schlenger, L. G. Tornatzky, W. W. Tornow; **Professors Emeriti:** K. L. Barkley, J. C. Johnson, H. G. Miller, P. W. Thayer; **Associate Professors:** L. E. Baker-Ward, C. C. Brookins, S. A. Converse, D. O. Gray, A. G. Halberstadt, M. E. Haskett, P. F. Horan, K. W. Klein, S. B. Pond III, A. C.

Schulte, M. A. Wilson, M. S. Wogalter; *Adjunct Associate Professors*: B. B. Burrus, B. F. Corder, A. D. Hall; *Associate Professors Emeriti*: J. L. Cole, R. F. Rawls; *Clinical Assistant Professors*: M. Y. Bingham, P. W. Collins; *Adjunct Assistant Professors*: B. H. Beith, J. W. Fleenor, C. L. Kronberg, C. E. Lorenz, B. H. Rogers

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: C. D. Korte, R. G. Pearson, J. L. Wasik; *Assistant Professor*: E. N. Wiebe

The Department of Psychology offers seven courses of study leading to the Ph.D.: developmental psychology, ergonomics (human factors), experimental psychology, human resource development, industrial/organizational and vocational psychology, school psychology and social psychology.

Admission Requirements: Applicants should have satisfactory grades in all undergraduate work and at least a "B" average in undergraduate psychology courses, satisfactory scores on the GRE including the Advanced Test in psychology and three satisfactory letters of recommendation. The Miller Analogies Test is also recommended. Match of applicants' research interests with current faculty research is also considered.

Master's Degree Requirements: Specific course requirements vary by area. Typical programs will include from 30 to 55 hours. The M.S. degree is available as part of work toward the doctorate, but students wishing to obtain a terminal M.S. are advised to consider other programs.

Doctoral Degree Requirements: The graduate program for each doctoral student is determined in conjunction with the student's graduate advisory committee and tailored to the needs, interests, and accomplishments of the individual. Students can expect to take from 36 to 54 hours of credit beyond the master's degree.

Student Financial Support: Many graduate students receive financial support in the form of teaching or research assistantships. Applicants should request such support when they apply to the program.

GRADUATE COURSES

PSY 510 Advanced Problems in Psychology.

PSY 513 Psychology and Law.

PSY(PHI) 525 Introduction to Cognitive Science.

PSY 620 Special Problems in Psychology.

PSY 641 Psychological Clinic Practicum.
 PSY 651 Internship in Psychology.
 PSY 680 Research Problems in Psychology.
 PSY 685 Master's Supervised Teaching.
 PSY 693 Master's Supervised Research.
 PSY 695 Master's Thesis Research.
 PSY 699 Master's Thesis Preparation.
 PSY 700 Visual Perception.
 PSY 702 Physiological Psychology.
 PSY 703 Biological Factors in Abnormal Behavior.
 PSY 704 Learning and Motivation.
 PSY 706 Psychology of Gender.
 PSY 708 Cognitive Processes.
 PSY 710 Special Topics in Psychology.
 PSY 711 Advanced Social Psychology.
 PSY 712 Attitudes.
 PSY 713 Attribution.
 PSY 714 Social Psychology: Small Groups Research.
 PSY 720 Psychological Survey Operations.
 PSY 721 Area Seminar in School Psychology.
 PSY 722 Individual Intelligence Measurement.
 PSY 723 Personality Measurement.
 PSY 724 Psychological Intervention I.
 PSY 725 Psychological Intervention II.
 PSY 727 Psychological Consultation.
 PSY 732 Theories of Intelligence.
 PSY(IE) 740 Human Factors in Systems Design.
 PSY(IE) 743 Ergonomic Performance Assessment.
 PSY(IE) 744 Human Information Processing.
 PSY(IE) 745 Human Performance
 PSY 750 Area Seminar in Human Resources Development.
 PSY 751 Human Resource Planning.
 PSY 752 Action Research in Psychology.
 PSY 753 Principles and Practice of Ecological/community Psychology.
 PSY 755 Cross-cultural Research and Development.
 PSY 756 Consumer Research.
 PSY 757 Innovation and Technology: A Socio-technical Perspective.
 PSY 758 Psychology and the African Experience.
 PSY 760 Tests and Measurements.
 PSY 761 Psychological Measurement.
 PSY 762 Quasi-experimental Evaluation Design.
 PSY 763 Systems Theory and Applications in Human Resource Development.
 PSY 765 Vocational Psychology.

PSY 766 Personnel Selection Research.
PSY 767 Training Research.
PSY 768 Organizational Psychology.
PSY 769 Work Motivation.
PSY 770 Organization Development and Change.
PSY 782 Adolescent Development.
PSY 784 Advanced Developmental Psychology.
PSY 785 Methodological Issues in Developmental Psychology.
PSY 786 Cognitive Development.
PSY 787 Social Development.
PSY 788 Adulthood and Aging: Cognitive and Intellectual Change.
PSY 789 Socio-emotional Processes in Adulthood and Aging.
PSY 791 History and Systems of Psychology.
PSY 792 Psychology of Families and Parenting.
PSY 795 Stress and Coping.
PSY 796 Advanced Educational Psychology.
PSY 800 Introduction to Graduate Study in Psychology.
PSY(IE) 802 Area Seminar in Ergonomics.
PSY 807 Advanced Seminar in Research Design.
PSY 809 Psychology Colloquium.
PSY 820 Special Problems in Psychology.
PSY 825 Advanced Problems in Perception.
PSY 826 Advanced Problems in Cognition.
PSY 841 School Psychology Practicum.
PSY 851 Internship in Psychology.
PSY 880 Directed Study in Psychology.
PSY 885 Doctoral Supervised Teaching.
PSY 890 Doctoral Preliminary Examination.
PSY 893 Doctoral Supervised Research.
PSY 895 Doctoral Dissertation Research.
PSY 899 Doctoral Dissertation Preparation.

Public Administration

Degree Offered: Ph.D., Master of Public Administration

GRADUATE FACULTY

Professor J. H. Svava, Program Director

Box 8102, (919) 515-5159, svava@social.chass.ncsu.edu

Professors: C. K. Coe, D. M. Daley, G. D. Garson, M. S. Soroos, D. W. Stewart; **Associate Professors:** E. O'Sullivan, J. E. Swiss, M. L. Vasu; **Assistant Professor:** R. L. Korosec; **Visiting Assistant Professor:** S. K. Straus

Administrative specialties are available in the following areas: administration of justice, association/non-profit management, data management, environmental policy and management, financial management, human resource management and urban/local government management. The first doctoral program in public administration in N.C. providing advanced education in the field of public management, the Ph.D. is intended to prepare students for teaching and research in public management and related fields and as research specialists in governmental agencies and public affairs research institutes.

Admission Requirements: Since a limited number of pre-service students (*i.e.*, those without professional or managerial work positions) are admitted, applicants to the M.P.A. program are encouraged to submit all materials by May 15 in order to receive full consideration. Admission to the doctoral program normally requires the completion of the M.P.A. or other relevant graduate degree. Applicants are encouraged to submit all materials as soon as possible to assure consideration for teaching assistantships, and although applications will be accepted through June 1, decisions regarding admission and assistantships will depend on availability of space and resources. Admission decisions are made on April 1, May 15 and July 1.

Master's Degree Requirements: The MPA degree is a 40-semester-hour program consisting of several overlapping tiers: (1) prerequisites to program admission including a course in economics and an intermediate-level course in statistics; (2) a core curriculum of 17 hours; (3) a choice of administrative specialties based on courses in public administration and other departments; and (4) an internship or field experience requirement for pre-service students. It is an option B with a one-person committee and no final oral examination.

Doctoral Degree Requirements: Entering students will complete the core courses in the M.P.A. program (or equivalent courses from other institutions) along with a graduate-level statistics course as prerequisites to the program. Fifty-four hours beyond the master's degree including the dissertation and research seminars (including PA 761, PA 762, PA 763, PA 764) and courses in methodology/statistics (including PA 765, PA 766) are required.

Student Financial Support: A limited number of fellowships and graduate assistantships are offered by the department. Contact the department for more information. Other forms of student aid are described in the financial aid section of the Graduate Bulletin. Students interested in financial assistance should apply by April 1.

Other Relevant Information: The MPA program regularly conducts an Assessment Center to enhance students' skills in oral communication, technical writing and group dynamics. It is required for pre-service students. Activities include technical writing evaluations, evaluations of oral presentation skills and in-basket exercises to measure interpersonal, problem-solving and managerial skills. These exercises enable students to gain valuable training beyond their academic experience.

GRADUATE COURSES

- PA 500 Public Administration.**
- PA 501 Effective Writing for Public Managers.**
- PA 510 Ethics and Professional Practice.**
- PA 511 Public Policy Analysis.**
- PA 512 The Budgetary Process.**
- PA 513 Seminar in Organization Theory.**
- PA 514 Management Systems.**
- PA 515 Research Methods and Analysis.**
- PA 525 Organization Design.**
- PA 545 Administrative Law.**
- PA 555 Administration of Justice.**
- PA 598 Special Topics.**
- PA 602 Oral Presentation for Public Managers.**
- PA 610 Special Topics.**
- PA 635 Readings and Research.**
- PA 650 Internship in Public Affairs.**
- PA 660 Public Management Computing Lab.**
- PA 685 Master's Supervised Teaching.**
- PA 701 Politics and Ethics of Public Administration.**
- PA 705 Seminar in Urban Management.**
- PA 707 Government and Planning.**
- PA 715 Financial Management in the Public Sector.**
- PA 716 Seminar in Program Evaluation.**
- PA 719 Intergovernmental Relations in the United States.**
- PA 720 Environmental Policy.**
- PA 721 Environmental Administration.**
- PA 731 Seminar in Public Personnel Management.**
- PA 732 Collective Negotiations in the Public Service.**
- PA 735 Team Building for Public Managers.**
- PA 736 Association Management.**
- PA 740 Computer Applications in Public Affairs.**
- PA 741 Geographic Information Systems for Public Administration.**
- PA 761 Foundations of Public Administration.**
- PA 762 Public Organization Theory.**

- PA 763 Public Policy Process.**
- PA 764 Budgeting and Financial Management.**
- PA 765 Quantitative Research in Public Administration.**
- PA 766 Advanced Research Methodology.**
- PA 780 Independent Study.**
- PA 810 Special Topics.**
- PA 835 Readings and Research.**
- PA 851 Internship in Public Affairs.**
- PA 860 Public Management Computing Lab.**
- PA 880 Directed Study.**
- PA 885 Doctoral Supervised Teaching.**
- PA 890 Doctoral Preliminary Examination.**
- PA 893 Doctoral Supervised Research.**
- PA 895 Doctoral Dissertation Research.**
- PA 899 Doctoral Dissertation Preparation.**

Public History

For a listing of graduate faculty and program information, see history.

Reading

For a listing of graduate faculty and program information, see curriculum and instruction.

Rural Sociology

For a listing of graduate faculty and program information, see sociology and anthropology.

Science Education

For a listing of graduate faculty and program information, see mathematics, science and technology education.

Social Studies Education

For a listing of graduate faculty and program information, see curriculum and instruction.

Sociology and Anthropology

Degrees Offered: Ph.D., M.S., Master of Sociology

GRADUATE FACULTY

Professor W. B. Clifford II, *Head of the Department*

Professor J. C. Leiter, *Director of Graduate Programs*

Box 8017, (919) 515-2702, Fax (919) 515-2610, gradprog@server.sasw.ncsu.edu

William Neal Reynolds Professors: L. B. Otto, R. C. Wimberley

Professors: W. B. Clifford II, L. R. Della Fave, V. A. Hiday, T. J. Hoban, J. C. Leiter, R. L. Moxley, B. J. Risman, M. M. Sawhney, M. D. Schulman, D. Tomaskovic-Devey, E. M. Woodrum, M. A. Zahn, M. T. Zingraff; *Professors Emeriti:* E. M. Crawford, T. N. Hobgood Jr., C. P. Marsh, M. E. Volland, J. N. Young; *Associate Professors:* M. P. Atkinson, R. F. Czaja, S. K. Garber, T. N. Greenstein, S. C. Lilley, P. L. McCall, A. L. Schiller, M. L. Schwalbe, M. Thomas, M. S. Thompson, R. J. Thomson, K. M. Troost, M. L. Walek, J. M. Wallace III, C. R. Zimmer; *Associate Professors Emeriti:* R. C. Brisson, A. C. Davis, J. G. Peck; *Assistant Professors:* R. S. Ellovich, R. L. Engen, W. R. Smith; *Assistant Professors Emeriti:* C. G. Dawson, T. M. Hyman

ASSOCIATE MEMBER OF THE PROGRAM

Professor: R. D. Mustian

The department offers master's and doctoral programs in sociology designed to prepare students for academic, research, and applied careers. The programs are structured to provide an intellectually stimulating and academically rigorous, yet supportive, environment that emphasizes developing research skills through course work and close collaboration with faculty.

Admissions Requirements: In addition to general Graduate School requirements, applicants are required to provide a writing sample. For fall admission, the completed application should be received no later than February 1 to ensure full consideration for assistantship support; final deadline for fall admission is April 15. Applications for spring admission are considered under special circumstances, but assistantship support is less likely; final deadline for spring admission is November 1.

Master's Degree Requirements: Applicants should have received/be receiving a bachelor's degree from an accredited institution with a major in sociology. Other majors are considered, but students may have to make up deficiencies without credit.

The M.S. requires a thesis, whereas a Master of Sociology (M.SOC.) requires 6 semester credit hours of practicum (supervised field placement in an organization or agency) and a research paper. A minor for both degrees is optional.

Doctoral Degree Requirements: The Ph.D. normally requires a master's in sociology, at least 14 courses (including or after the master's). Doctoral students take core courses in theory and methods/ analysis and select courses in two areas of specialization. Some course work from the master's may be applied. A minor is optional.

Student Financial Support: Teaching and research assistantships are available on a competitive basis.

GRADUATE COURSES

- SOC 601 Seminar.
- SOC 610 Special Topics in Sociology.
- SOC 642 Practicum in Sociology.
- SOC 685 Master's Supervised Teaching.
- SOC 690 Master's Examination.
- SOC 693 Master's Supervised Research.
- SOC 695 Master's Thesis Research.
- SOC 699 Master's Thesis Preparation.
- SOC 701 Classical Sociological Theory.
- SOC 702 Contemporary Sociological Theory.
- SOC 703 Theory Construction.
- SOC 707 Quantitative Sociological Analysis.
- SOC 708 Advanced Sociological Analysis.
- SOC 711 Research Methods in Sociology I.
- SOC 712 Research Methods in Sociology II.
- SOC 713 Applied Research.
- SOC 716 Community Organization and Development.
- SOC 717 The Community.
- SOC 721 Deviant Behavior.
- SOC 722 Social Control.
- SOC 723 Research on Crime and Deviance.
- SOC 724 Crime and Collective Action.
- SOC 726 Developing Societies.
- SOC 727 Comparative Societies.
- SOC 728 Social Systems and Planned Change.
- SOC 731 Survey of Family Sociology.
- SOC 732 Contemporary Family Theory and Research.
- SOC 736 Social Stratification.

SOC 737 Sociology of Gender.
 SOC 738 Race and Ethnic Inequality.
 SOC 739 Social Psychology of Inequality.
 SOC 741 Medical Sociology.
 SOC 742 Social-Psychological Processes in Health and Illness.
 SOC 746 Sociological Social Psychology.
 SOC 747 Social Psychology.
 SOC 751 Social Organization.
 SOC 752 Work and Industry.
 SOC 753 Formal Organizations.
 SOC 756 Sociological Analysis of Agricultural Development.
 SOC 757 Sociology of U.S. agriculture.
 SOC 758 Rural Sociology.
 SOC 761 Population Problems.
 SOC 762 Urban Ecology.
 SOC 766 Sociology of Religion.
 SOC 800 Professional Seminar.
 SOC 801 Seminar.
 SOC 810 Special Topics.
 SOC 885 Doctoral Supervised Teaching.
 SOC 890 Doctoral Preliminary Examination.
 SOC 893 Doctoral Supervised Research.
 SOC 895 Doctoral Dissertation Research.
 SOC 899 Doctoral Dissertation Preparation.

Soil Science

Degrees Offered: Ph.D., M.S., Master of Soil Science, Master of Natural Resources

GRADUATE FACULTY

Professor J. L. Havlin, Head of the Department

Professor C. D. Raper Jr., Director of Graduate Programs

Box 7619, (919) 515-2643, david_raper@ncsu.edu

William Neal Reynolds Professor and Graduate Alumni Distinguished Professor:
 S. W. Buol

William Neal Reynolds Professor: J. W. Gilliam

Professors: A. Amoozegar, S. W. Broome, D. K. Cassel, F. R. Cox, S. C. Hodges, M. T. Hoover, G. D. Hoyt, L. D. King, H. J. Kleiss, G. S. Miner, M. J. Vepraskas, R. J. Volk, J. B. Weber, A. G. Wollum II, J. P. Zublena; *Professor*

(USDA): D. W. Israel; **Adjunct Professor:** R. J. McCracken; **Professors Emeriti:** W. V. Bartholomew, M. G. Cook, G. A. Cummings, R. W. Cummings, R. B. Daniels, C. B. Davey, W. A. Jackson, C. B. McCants, J. A. Phillips, P. A. Sanchez, E. D. Seneca, S. B. Weed; **Associate Professors:** R. A. McLaughlin, R. L. Mikkelsen, G. C. Naderman Jr., J. E. Shelton, T. J. Smyth, M. G. Waggoner; **Associate Professor Emeritus:** J. P. Lilly; **Assistant Professors:** D. A. Crouse, C. R. Crozier, D. L. R. Hesterberg, D. L. Lindbo, D. L. Osmond; **Assistant Professor Emeritus:** C. K. Martin; **Senior Researcher:** W. P. Robarge

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: H. L. Allen Jr., T. L. Grove, R. Lea, G. F. Peedin, R. W. Skaggs; **Associate Professor (USDA):** S. R. Shafer; **Assistant Professor:** L. T. Henry

Graduate students in soil science may specialize in the following subdisciplines: soil physics, soil chemistry; soil microbiology and biochemistry; soil fertility and plant nutrition; soil genesis, morphology and classification; soil and water management and conservation; forest soils, soil mineralogy; tropical soil management.

Admissions Requirements: Graduate students accepted in soil science must have a bachelor or master's degree with a major in soil science or a closely related field and with a strong background in the biological and physical sciences.

Master's Degree Requirements: A minor is optional, although one-third of the credits should usually be in courses outside of the department.

Doctoral Degree Requirements: A minor is optional, although one-third of the credits should usually be in courses outside of the department.

Student Financial Support: The department has a number of assistantships available to students who have demonstrated a high level of academic aptitude or potential. Most of the graduate assistantships are half-time.

GRADUATE COURSES

SSC(BAE) 573 Hydrologic and Water Quality Modeling.

SSC 601 Seminar.

SSC 609 Colloquium.

SSC 620 Special Problems.

SSC 685 Master's Supervised Teaching.

SSC 690 Master's Examination.

SSC 693 Master's Supervised Research.

SSC 695 Master's Thesis Research.

- SSC 699 Master's Thesis Preparation.
- SSC 701 Tropical Soils: Characteristics and Management.
- SSC 711 Soil Physics.
- SSC 720 Soil and Plant Analysis.
- SSC 721 Soil Chemistry.
- SSC 722 Advanced Soil Chemistry.
- SSC(CS,HS,TOX) 725 Pesticide Chemistry.
- SSC(CS,HS,TOX) 727 Pesticide Behavior in Soil and Water.
- SSC(MB) 732 Soil Microbiology.
- SSC 741 Soil Fertility.
- SSC 751 Soil Morphology, Genesis and Classification.
- SSC 753 Soil Mineralogy.
- SSC 760 Advanced Soil Management.
- SSC 762 Environmental Applications of Soil Science.
- SSC(BAE) 771 Theory of Drainage--Saturated Flow.
- SSC 772 Soil Properties and Plant Development.
- SSC(FOR) 773 Forest Productivity: Edaphic Relationships.
- SSC(BAE) 774 Theory of Drainage--Unsaturated Flow.
- SSC(CS,FOR) 777 Conservation and Sustainable Development I: Concepts and Methods.
- SSC(FOR) 778 Conservation and Sustainable Development II: Integrated Problem Solving.
- SSC(BAE) 780 Transport and Fate of Chemicals in Soils and Natural Waters.
- SSC(FOR) 781 Agroforestry.
- SSC(FOR)782 Silviculture and Management of Forest Plantations in the Tropics.
- SSC 801 Seminar
- SSC 809 Colloquium.
- SSC 820 Special Problems.
- SSC 885 Doctoral Supervised Teaching.
- SSC 890 Doctoral Preliminary Examination.
- SSC 893 Doctoral Supervised Research.
- SSC 895 Doctoral Dissertation Research.
- SSC 899 Doctoral Dissertation Preparation.

Special Education

For a listing of graduate faculty and program information, see curriculum and instruction.

Statistics

Degrees Offered: Ph.D., M.S., Master of Statistics

GRADUATE FACULTY

Professor T. M. Gerig, *Head of the Department*

Professor S. G. Pantula, *Director of Graduate Programs*

Box 8203, (919) 515-2528, dsgp@stat.ncsu.edu

Graduate Alumni Distinguished Professor: B. B. Bhattacharyya

William Neal Reynolds Professor: B. S. Weir

Professors: R. L. Berger, P. Bloomfield, D. D. Boos, C. Brownie, M. Davidian, D. A. Dickey, E. J. Dietz, S. P. Ellner, F. G. Giesbrecht, J. F. Monahan, D. W. Nychka, K. H. Pollock, D. L. Ridgeway, D. L. Solomon, L. A. Stefanski, W. H. Swallow, A. A. Tsiatis, J. L. Wasik; **Adjunct Professors:** M. W. Anderson, J. R. Chromy, J. H. Goodnight, P. D. Haaland, N. L. Kaplan, P. H. Morgan; **Professors Emeriti:** H. J. Gold, A. H. Grandage, R. J. Hader, D. W. Hayne, R. J. Monroe, L. A. Nelson, C. H. Proctor, C. P. Quesenberry, J. O. Rawlings, J. A. Rigney, R. G. Steel, H. R. Van Der Vaart, O. Wesler; **Associate Professors:** M. L. Gumpertz, T. B. Kepler, J. Lu, T. W. Reiland, C. E. Smith; **Research Associate Professor:** S. Zeng; **Adjunct Associate Professor:** T. K. Pierson; **Associate Professor Emeritus:** A. C. Linnerud; **Assistant Professors:** S. K. Ghosh, J. M. Hughes-Oliver, S. R. Lubkin, J. L. Thorne; **Adjunct Assistant Professors:** P. M. Dixon, J. S. Kimbell, M. W. Lutz

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: W. R. Atchley, J. F. Gilliam, M. M. Goodman, A. R. Hall, T. Johnson, J. F. Selgrade, M. W. Suh, G. G. Wilkerson; **Associate Professor:** T. H. Emigh

Admission Requirements: The written statement should describe the applicant's academic and career goals as well as special interests in the area of statistics. GRE General Test scores are required. The well-prepared applicant to the department's master's programs has good grades in a three-semester calculus sequence, a two-semester advanced calculus sequence, a semester of linear algebra and a two-semester sequence in probability and statistics. Some of these courses may be taken as part of the program, but this may result in lengthening the stay. Admission to the Ph.D. program is granted to those who have been admitted to the master's program and have passed the basic comprehensive (qualifying) examination at the Ph.D. level. Individuals applying for fall enrollment and who wish to be considered for

financial aid should have their completed applications in by no later than March 1 for fall enrollment or October 15 for spring. Applications arriving after that will be considered but may be assigned lower priority.

Master's Degree Requirements: All master's programs in statistics require a minimum of 34 credit hours, of which 12 are first-year core (ST 701, ST 741, 742 and ST 743), one is supervised consulting (ST 641), and at least nine are statistics and/or supporting electives. The remaining 12 hours are program dependent.

Doctoral Degree Requirements: The Ph.D. program in statistics requires 22 course credit hours beyond the master's, of which 12 are Ph.D. core (ST(MA) 778, 779, ST 793 and ST 794), one is supervised consulting (ST 841), six are Ph.D.-level statistics electives, and three are supporting electives. Requirements for co-majors are individually tailored.

Student Financial Support: Departmental assistantships and fellowships are awarded each year on a competitive basis. Fellowships and supplements are provided through the department's Gertrude M. Cox Fellowship Fund. Approximately 30 teaching assistantships and 30 research assistantships and traineeships are available along with 10 graduate industrial traineeships supported by local industries.

Other Relevant Information: With a large graduate faculty representing virtually all major statistical specializations, the department is recognized as a world leader in graduate education and research in statistics. Its applied orientation sets it apart from most other departments in the country, offering education to those wishing to pursue careers as consulting statisticians in industry and government, as well as to those seeking careers in research and teaching.

Areas of research specialization of the faculty and advanced graduate students include time series, econometrics, statistical genetics and ecology, experiment design and analysis, sampling, environmental applications, statistical process and quality control, biostatistics, biomathematics, statistical computing, nonparametric regression, robust and nonparametric inference, mathematical programming, Bayesian inference, multivariate analysis, decision theory and stochastic processes.

The department also houses the statistical genetics research program, an internationally respected research group of faculty, post-doctoral fellows and graduate students. Long-standing research projects in environmental and industrial statistics provide research and funding opportunities for graduate students. In addition, departmental computation facilities consist of two computing laboratories: the Statistics Instructional Computing Laboratory (SICL), used for instruction and course labs, and the Statistics Research Computing and Information System (SRCIS), a research facility maintained for the use of statistics graduate students.

GRADUATE COURSES

- ST 500 Statistics for the Behavioral Sciences I.
- ST 501 Experimental Statistics for Biological Sciences I.
- ST 502 Experimental Statistics for Engineers I.
- ST 503 Statistics for Management I
- ST 504 Statistics for Management and Social Sciences II.
- ST(MA) 546 Theory of Probability I.
- ST(ECG) 561 Intermediate Econometrics.
- ST 590 Special Topics.
- ST 601 Seminar.
- ST 610 Topics in Statistics.
- ST 620 Special Problems.
- ST(TOX) 621 Statistical Problems in Toxicology.
- ST 625 Advanced Special Problems.
- ST 630 Independent Study.
- ST 635 Readings.
- ST 641 Statistical Consulting.
- ST 685 Master's Supervised Teaching.
- ST 690 Master's Examination.
- ST 693 Master's Supervised Research.
- ST 695 Master's Thesis Research.
- ST 699 Master's Thesis Preparation.
- ST 700 Statistics for the Behavioral Sciences II.
- ST 701 Experimental Statistics for Biological Sciences II.
- ST 702 Experimental Statistics for Engineers II.
- ST(MA,OR) 706 Nonlinear Programming.
- ST 707 Statistics in Plant Science.
- ST 708 Applied Least Squares.
- ST(ZO) 710 Sampling Animal Populations.
- ST 711 Design of Experiments.
- ST 712 Statistical Process Control.
- ST 713 Off-line Quality Control.
- ST 714 Life-testing and Reliability.
- ST 715 Theory of Sampling Applied to Survey Design.
- ST 720 Statistical Principles of Clinical Trials and Epidemiology.
- ST(GN) 721 Genetic Data Analysis.
- ST(BMA,OR) 722 Decision Analytic Modeling.
- ST 730 Applied Time Series Analysis.
- ST 731 Applied Multivariate Statistical Analysis.
- ST 732 Applied Longitudinal Data Analysis.
- ST 733 Applied Spatial Statistics.
- ST 740 Applied Nonparametric Statistics.

ST 741 Statistical Theory I.
 ST 742 Statistical Theory II.
 ST 743 Linear Models and Variance Components.
 ST 744 Categorical and Censored Data Analysis.
 ST 745 Analysis of Survival Data.
 ST(MA) 746 Introduction to Stochastic Processes.
 ST 750 Statistical Computing.
 ST(ECG) 751 Econometrics.
 ST(ECG) 752 Topics in Econometrics.
 ST 755 Advanced Analysis of Variance and Variance Components.
 ST(GN) 756 Computational Molecular Evolution.
 ST 760 Advanced Topics in Construction and Analysis of Experimental Designs.
 ST 762 Nonlinear Statistical Models for Univariate and Multivariate Response.
 ST(GN) 770 Statistical Concepts in Genetics.
 ST(BMA,MA) 771 Biomathematics I.
 ST(BMA,MA) 772 Biomathematics II.
 ST(BMA,MA,OR) 773 Stochastic Modeling.
 ST(MA) 778, 779 Measure Theory and Advanced Probability.
 ST 782 Time Series Analysis: Time Domain.
 ST 783 Time Series Analysis: Frequency Domain.
 ST 784 Multivariate Analysis.
 ST 785 Introduction to Statistical Decision Theory.
 ST 790 Advanced Special Topics.
 ST 793 Advanced Statistical Inference I.
 ST 794 Advanced Statistical Inference II.
 ST 801 Seminar.
 ST 820 Special Problems.
 ST 825 Advanced Special Problems.
 ST 841 Statistical Consulting.
 ST 885 Doctoral Supervised Teaching.
 ST 890 Doctoral Preliminary Examination.
 ST 893 Doctoral Supervised Research.
 ST 895 Doctoral Dissertation Research.
 ST 899 Doctoral Dissertation Preparation

Technical Communication

For a listing of graduate faculty and program information, see English.

Technology Education

For a listing of graduate faculty and program information, see mathematics and science education.

Textile and Apparel, Technology and Management

Degrees Offered: M.S., Master of Textiles

GRADUATE FACULTY

Professor T. J. Little, *Head of the Department*

Professor W. Oxenham, *Director of Graduate Programs*

Box 8301, (919) 515-6633, william_oxenham@ncsu.edu

Klopman Distinguished Professor: S. C. Winchester Jr.

Professors: R. A. Barnhardt, S. K. Batra, R. A. Donaldson, A. H. El-Shiekh, M. W. Suh; *Adjunct Professors:* D. S. Brookstein, R. W. Dent; *Professors Emeriti:* A. B. Moss, G. A. Berkstresser III, W. C. Stuckey Jr.; *Associate Professors:* P. Banks-Lee, H. A. Davis, T. K. Ghosh, H. H. A. Hergeth, G. L. Hodge, C. Istook, A. M. Seyam, G. W. Smith; *Adjunct Associate Professors:* N. A. Hunter, D. M. Powell, P. E. Sasser, D. Shiffler; *Associate Professors Emeriti:* P. B. Hudson, M. L. Robinson Jr.; *Visiting Assistant Professor:* P. Srinivasan

The Department of Textile and Apparel, Technology and Management offers the degree of Master of Science in Textiles with specializations in textile technology management and textile technology and the professional degree of Master of Textiles. The department specializes in the disciplines of textile management, apparel management, textile technology, textile design, integrated manufacturing systems, textile marketing, quality control and modeling of the textile and apparel pipeline. Fundamental research in yarn and fabric mechanics, machine monitoring and material properties is also conducted in the department.

Admission Requirements: Students applying to this department should have or be able to develop strong quantitative skills. Students interested in management areas should have background in market analysis, quantitative management and quality management. Students should have a minimum of 24 course hours in advanced mathematics and sciences in their undergraduate degree.

Master's Degree Requirements: The M.S. in textiles with specializations in textile technology management and textile technology requires a minimum of 36 course

hours to be composed of 15 credit hours from a core of courses in textile technology and textile management, 9 credit hours in supporting courses (minor), 2 credit hours from graduate seminar, 6 credit hours of research, with the remaining 4 hours from courses, research or "special projects." The non-thesis Master of Textiles requires a minimum of 33 credit hours (at least 9 taken in supporting courses (minor)).

Student Financial Support: Financial aid in the form of assistantships may be available for full-time Master of Science students.

Other Relevant Information: The Department of Textile and Apparel Technology and Management currently houses the National Science Foundation's Center for Nonwoven Technology. This Center allows students to conduct research in new technologies for nonwoven fabric manufacture. Participation in the National Textile Center allows students to conduct research in a variety of management, manufacturing, technology and engineering applications.

GRADUATE COURSES

TT(TE) 520 Yarn Processing Dynamics.

TT(TE, TTM) 530 Textile Quality Control.

TT(TE) 541 Theory and Practice of Knitted Fabric Production and Control.

TT(TE) 549 Warp Knit Engineering and Structural Design.

TT(TE) 550 Production Mechanics and Properties of Woven Fabrics.

TT 551 Advanced Woven Fabric Design.

TT 589 Special Studies in Textile Technology.

TT(TM) 601 Seminar.

TT 630 Independent Study in Textile Technology.

TT 676 Special Projects Textile Technology.

TT(TTM) 685 Master's Supervised Teaching.

TT(TTM) 690 Master's Examination.

TT(TTM) 693 Master's Supervised Research.

TT(TTM) 695 Master's Thesis Research.

TT(TTM) 699 Master's Thesis Preparation.

TT(FPS) 720 Yarn Production/properties: Advanced Topics.

TT(FPS,TE) 721 Advanced Textile Testing.

TT(FPS) 750 Advances in Woven Fabrics

TTM 501 Enterprise Integration.

TTM 502 SCADA.

TTM(TE,TT) 531 Total Quality Management in Textiles.

TTM 561 Strategic Textile Management.

TTM(BUS) 585 Market Research in Textiles.

TTM 589 Special Studies in Textile Technology Management.

TTM 630 Independent Study in Textile Technology Management.

- TTM 676 Special Projects in Textile Technology Management.
 TTM 761 Supply Chain Management.
 TTM 786 Advanced Textile Labor Management Seminar.
 TTM 787 Competitive Strategy and Planning for the Textile Firm.

Textile Chemistry

For a listing of graduate faculty and program information, see textile engineering, chemistry and science.

Textile Engineering

For a listing of graduate faculty and program information, see textile engineering, chemistry and science.

Textile Engineering, Chemistry and Science

Degrees Offered: M.S. in Textile Chemistry, M. S. in Textile Engineering, M.S. in Textile Materials Science, Master of Textiles

GRADUATE FACULTY

Professor K. R. Beck, *Head of the Department*

Ciba-Geigy Professor: H. S. Freeman, *Associate Head and Director of Graduate Programs*

Box 8301, (919) 515-6636, harold_freeman@ncsu.edu

Cone Mills Professor: R. McGregor

Professors: R. L. Barker, D. R. Buchanan, T. G. Clapp, A. H. M. El-Shiekh, P. L. Grady, B. S. Gupta, H. Hamouda, S. M. Hudson, C. D. Livengood, G. N. Mock, C. B. Smith, M. H. Theil, A. E. Tonelli; *Adjunct Professor:* R. F. Goldman; *Professors Emeriti:* J. F. Bogdan, K. S. Campbell, D. M. Cates, D. W. Chaney, J. A. Cuculo, P. Emerson, R. D. Gilbert, D. S. Hamby, S. P. Hersh, M. H. M. Mohamed, P. R. Lord, H. A. Rutherford, C. Tomasino, P. A. Tucker Jr., W. K. Walsh, W. M. Whaley; *Associate Professors:* P. J. Hauser, W. J. Jasper, J. W. Rucker, J. P. Rust; *Adjunct Associate Professors:* W. P. Behnke, L. D. Claxton, W. D. Hunter, T. G. Montgomery; *Associate Professors Emeriti:* A. C. Hayes, T. G. Rochow; *Assistant Professors:* M. G. McCord, Y. Qiu, M. Srinivasarao; *Visiting Assistant Professors:* M. B. Gunner, D. Hinks, K. J. Titus; *Adjunct Assistant Professors:* A. C. Bullerwell, Y. Wang

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: S. K. Batra, R. E. Fornes

Master of Science in Textile Chemistry (MS/TC): The M.S. in textile chemistry program offers unique educational and research opportunities in textile and polymer chemistry. Fundamentals of chemistry, physics, and mathematical sciences are applied to solve polymer and textile wet processing problems. **M.S. in Textile Engineering (MS/TE):** The M.S. in textile engineering offers unique educational and research opportunities in machine, process and product design. Fundamentals of physics, engineering, and mathematical sciences are applied to textile-related problems.

Admission Requirements: (MS/TC): Applicants must have a physical science or engineering background, including physical chemistry and differential equations. Formal education in textile or polymer chemistry is desired but not required. **(MS/TE):** Applicants must have a physical science or engineering background including differential equations. A background in engineering mechanics, fluids, dynamics and control theory is highly recommended. Formal education in textile engineering or materials science is desired but not required.

Degree Requirements: (MS/TC): This degree requires 15 credit hours in textile chemistry, nine credit hours in a supporting area (minor), ten credit hours of research, and two semester credits from the College Seminar (TC 601). Additional course work may be substituted for part of the research credits. **(MS/TE):** This degree requires 15 credit hours in textile engineering/textile materials science, nine credit hours in a supporting area (minor), ten credit hours of research, and two semester credits from the College Seminar (TE or TMS 601). Additional course work may be substituted for part of the research credits.

Student Financial Support: Financial aid in the form of assistantships and fellowships is normally available for all full-time students.

Other Relevant Information: The department either houses or has access to all major analytical tools necessary to effect a quality research program covering a wide range of topics. It also houses state-of-the-art facilities for conducting research in fiber science and textile engineering. Close cooperation between College faculty and the fiber/textile and allied industries provides students with opportunities for learning and employment.

GRADUATE COURSES

- TC 530 The Chemistry of Textile Auxiliaries.
- TC(MAT) 561 Organic Chemistry of Polymers.
- TC 565 Polymer Applications and Technology.
- TC(TE,TMS) 589 Special Studies in Textile Engineering and Science.
- TC 601 Seminar.
- TC 630 Independent Study
- TC 685 Master's Supervised Teaching.
- TC 690 Master's Examination.
- TC 693 Master's Supervised Research.
- TC 695 Master's Thesis Research.
- TC 699 Master's Thesis Preparation.
- TC 704 Fiber Formation--Theory and Practice.
- TC 705 Theory of Dyeing.
- TC 706 Color Science.
- TC 707 Color Laboratory.
- TC 720 Chemistry of Dyes and Color.
- TC 721 Dye Synthesis Laboratory.
- TC 725 Dyeing Cellulose.
- TC(CH,MAT) 762 Physical Chemistry of High Polymers--Bulk Properties.
- TC(CHE) 769 Polymers, Surfactants and Colloidal Materials.
- TC 771 Polymer Microstructures, Conformations and Properties.
- TC(CH,MAT) 772 Physical Chemistry of High Polymers--Solution Properties.
- TC(CHE) 779 Diffusion in Polymers.
- TC 791 Special Topics in Textile Science.
- TC(TE,TMS) 792 Special Topics in Fiber Science.
- TE 501 Analysis and Design of Yarn Production Systems.
- TE 502 Dynamics of Fabric Production Systems.
- TE 505 Textile Systems and Control.
- TE(TT) 520 Yarn Processing Dynamics.
- TE(TTM) 531 Total Quality Management in Textiles.
- TE(TT) 550 Production Mechanics and Properties of Woven Fabrics.
- TE(TMS) 589 Special Studies in Textile Engineering and Science.
- TE(TMS) 601 Seminar
- TE(TMS) 602 Textile Technology Seminar
- TE(TMS) 630 Independent Study
- TE(TMS) 685 Master's Supervised Teaching.
- TE(TMS) 690 Master's Examination.
- TE(TMS) 693 Master's Supervised Research.
- TE(TMS) 695 Master's Thesis Research.
- TE(TMS) 699 Master's Thesis Preparation.
- TE 703 Group Research in Textiles

TE 705 Textile Instrumentation and Control Systems
TE(ECE,MAE, FPS) 717 Multivariable Linear Systems Theory.
TE(FPS,TT) 720 Yarn Production/Properties: Advanced Topics.
TE(FPS,TT) 781 Mechanics of Twisted Structures.
TE(FPS,TT) 782 Mechanics of Fabric Structures.
TMS 500 Fiber and Polymer Microscopy.
TMS(FPS) 761 Mechanical and Rheological Properties of Fibrous Material.
TMS(FPS,MAT) 762 Physical Properties of Fiber Forming Polymers, Fibers and Fibrous Structures.
TMS(FPS,MAT) 763 Characterization of Structure of Fiber Forming Polymers.
TMS(FPS,TE) 765 Textile Composites.

Textiles

For a listing of graduate faculty, courses, and program information, see textile and apparel, technology and management.

Textile Technology Management

Degree Offered: Ph.D.

GRADUATE FACULTY

Professor C. D. Livengood, ***Program Director***

Box 8301, (919) 515-6643, charles_livengood@ncsu.edu

Professors: R. A. Barnhardt, S. K. Batra, K. R. Beck, R. A. Donaldson, S. E. Elmaghraby, A. H. El-Shiekh, S.-C. Fang, P. L. Grady, B. S. Gupta, D. M. Holthausen Jr., T. J. Little, S. E. Margolis, W. Oxenham, C. B. Smith, M. W. Suh, S. C. Winchester; ***Professors Emeriti:*** G. A. Berkstresser III, J. R. Canada, M. H. M. Mohamed, A. B. Moss, C. Tomasino; ***Associate Professors:*** P. Banks-Lee, J. C. Beghin, T. K. Ghosh, H. H. A. Hergeth, G. L. Hodge, S. M. Hudson, J. W. Rucker, J. P. Rust, A. M. Seyam; ***Associate Professor Emeritus:*** P. B. Hudson

Textile technology management is a multidisciplinary program designed to educate students for research careers in the management of technology in the fiber, textile, apparel and related industries complex. The program is designed to give the students a breadth of knowledge of the materials and technologies employed in the industries as well as the quantitative and analytical tools of management.

Admission Requirements: Students majoring in textiles; industrial, systems and manufacturing engineering; statistics; operations research; computer science; economics; consumer economics; marketing; and business administration, and having at least a 3.0/4.0 average in their undergraduate studies and a master's degree will normally qualify for admission. Exceptionally qualified students may be admitted directly without a master's degree.

Doctoral Degree Requirements: Fixed credit-hour requirements for the Doctor of Philosophy degree are 72. (Up to 18 hours from an M.S. may be applied against the 72.) Students are admitted to candidacy for the Ph.D. degree after passing two preliminary written and oral examinations (the first covering manufacturing technology and the second the management of technology) and orally defending a research proposal. They must also have passed an English technical writing course during their college career and, depending on the nature of their research interests, may also be required to demonstrate a reading knowledge of one foreign language.

Student Financial Support: Financial aid in the form of assistantships and fellowships is normally available for all full-time students.

Other Relevant Information: In 1991, the College of Textiles moved to its new 298,000 square-foot complex, now valued at over \$50 million, which houses exceptional teaching, research, computer and library facilities. With a graduate faculty of 45 and research expenditures exceeding \$6,000,000 in fiscal year 1996/97, opportunities abound. Facilities available to textile technology management students include: the Model Manufacturing Facility which contains over \$10,000,000 of textile processing equipment from fiber formation to end products; the IBM Computer Integrated Manufacturing (CIM) Facility which contains PS/2's, AS/400 and RS/6000 computers running plant floor, supervisory monitoring and control, and manufacturing resource planning software packages; and the Textile Design Laboratory which contains several design packages which can communicate with plant floor devices providing CAD/CAM integration.

COURSE OFFERINGS (Extensive use may be made of graduate course offerings in other colleges on campus when developing the minor field. See departmental listing for descriptions.)

GENERAL COURSES

TTM 801 Seminar.

TTM 830 Independent Study.

TTM 876 Special Projects in Textile Technology Management.

TTM 885 Doctoral Supervised Teaching.

TTM 890 Doctoral Preliminary Examination.

TTM 893 Doctoral Supervised Research.
TTM 895 Doctoral Dissertation Research.
TTM 899 Doctoral Dissertation Preparation.

GRADUATE COURSES IN AREAS OF SPECIALIZATION

FPS(TE,TT) 781 Mechanics of Twisted Structures.
FPS(TE,TT) 782 Mechanics of Fabric Structures.
TMS(FPS,TE) 765 Textile Composites.
TTM(TE) 531 Total Quality Management.
TTM(BUS) 585 Market Research in Textiles.
TTM 589 Special Studies in Textile Technology Management.
TTM 630 Independent Study in Textile Technology Management.
TTM 676 Special Projects in Textile Technology Management.
TTM 786 Advanced Textile Labor Management Seminar.
TTM 787 Competitive Strategy and Planning for the Textile Firm.
TT(TE) 520 Yarn Processing Dynamics.
TT(TE,TTM) 530 Textile Quality Control.
TT(TE) 541 Theory and Practice of Knitted Fabric Production and Control.
TT(TE) 549 Warp Knit Engineering and Structural Design.
TT(TE) 550 Production Mechanics and Properties of Woven Fabrics.
TT 589 Special Studies in Textile Technology.
TT 630 Independent Study in Textile Technology.
TT 676 Special Projects in Textile Technology.
TT(FPS) 720 Yarn Production Properties.
TT(FPS) 721 Advanced Textile Testing.
TT(TE) 751, 752 Fabric Development and Construction.

Toxicology

Degrees Offered: Ph.D., M.S., Master of Toxicology

GRADUATE FACULTY

Professor G. W. Winston, Head of the Department
(919) 515-4377

Associate Professor G. A. LeBlanc, Director of Graduate Programs
Box 7633, (919) 515-7404

William Neal Reynolds and Graduate Alumni Distinguished Professor: E. Hodgson

Professors: R. B. Leidy, R. C. Smart; *Adjunct Professors:* J. A. Bond, P. C. Ferriola, J. A. Goldstein, R. J. Langenbach, R. M. Philpot, R. J. Preston;
Professor Emeritus: T. J. Sheets; *Associate Professor:* D. Shea; *Research Associate Professor:* T. L. Goldsworthy; *Adjunct Associate Professors:* A. E. Chalmers, N. Chernoff, K. M. Crofton, W. J. Fleming, H. B. Matthews Jr., L. Recio;

Assistant Professors: S. Branch, W. G. Cope; **Research Assistant Professor:** S. A. Meyer; **Visiting Assistant Professor:** R. L. Rose

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: K. B. Adler, A. L. Aronson, C. Brownie, C. F. Brownie, J. M. Cullen, W. E. Donaldson, H. M. Hassan, R. J. Kuhr, R. J. Linderman, W. H. McKenzie, N. A. Monteiro-Riveiere, M. A. Qureshi, J. E. Riviere, R. M. Roe, M. K. Stoskopf; **Associate Professors:** J. M. Horowitz, C. L. Robinette, I. M. Smoak; **Assistant Professors:** J. M. Law, R. T. Miller

Admission Requirements: Prospective students should have a strong background in the biological and physical sciences with a minimum undergraduate grade point average of 3.0 (on a 4.0 scale) in the biological and physical sciences.

Master of Science Degree Requirements: A minimum of 30 credit hours with at least 20 credit hours of graduate-level courses. A thesis is required.

Master of Toxicology Degree Requirements: A minimum of 14 credit hours in TOX courses are required. While a thesis is not required, at the discretion of the student's advisory committee, a review paper focusing on the student's interest in some aspect of toxicology might be required. The requirements, in all other respects, are the same as for the M.TOX and M.S. degrees.

Doctoral Degree Requirements: A minimum of 39 credit hours plus dissertation research is required for the Ph.D. degree.

Student Financial Support: Financial assistance is available for qualified applicants through traineeships, fellowships, teaching assistantships and research assistantships with participating faculty members.

Other Relevant Information: Students pursuing either the M.S. or Ph.D. degree may elect to specialize in environmental toxicology or cellular and molecular toxicology.

GRADUATE COURSES

TOX 620 Special Problems in Toxicology.
TOX(ST) 621 Statistical Problems in Toxicology.
TOX(BCH) 660 Free Radicals in Toxicology.
TOX 685 Master's Supervised Teaching.
TOX 690 Master's Examination.
TOX 693 Master's Supervised Research.
TOX 695 Master's Thesis Research.

TOX 699 Master's Thesis Preparation.
 TOX 701 General Toxicology.
 TOX 704 Chemical Risk Assessment.
 TOX(IMM) 705 Immunotoxicology.
 TOX 710 Biochemical Toxicology.
 TOX 715 Environmental Toxicology.
 TOX 721 Chemical Carcinogenesis.
 TOX(ENT) 722 Insecticide Toxicology.
 TOX(CS,HS,SSC) 725 Pesticide Chemistry.
 TOX(CS,HS,SSC) 727 Pesticide Behavior and Fate in the Environment.
 TOX 801 Seminar.
 TOX 820 Special Problems.
 TOX(BCH) 860 Free Radicals in Toxicology.
 TOX 885 Doctoral Supervised Teaching.
 TOX 890 Doctoral Preliminary Examination.
 TOX 893 Doctoral Supervised Research.
 TOX 895 Doctoral Dissertation Research.
 TOX 899 Doctoral Dissertation Preparation.

COURSES FROM ASSOCIATED DEPARTMENTS

BCH 553 Metabolism and Molecular Biology.
 BCH 701 Macromolecular Structure.
 BCH 703 Macromolecular Synthesis and Regulation.
 BCH 705 Molecular Biology of the Cell.
 BCH 761 Advanced Molecular Biology of the Cell.
 CBS 754 Principles of Epidemiology.
 CBS 762 Systemic Pharmacology and Toxicology.
 CBS 770 Cell Biology.
 CBS 787 Pharmacokinetics.
 GN 701 Molecular Genetics.
 ST 501 Experimental Statistics for Biological Sciences I.
 ZO 513 Comparative Physiology.
 ZO 760 Principles of Ecology.

Training and Development

For a listing of graduate faculty and program information, see adult and community college education.

Wood and Paper Science

Degrees Conferred: Ph.D., M.S., Master of Wood and Paper Science

THE GRADUATE FACULTY

Professor M. J. Kocurek, *Head of the Department*

Professor Emeritus R. D. Gilbert, *Director of Graduate Programs*

Box 8005, (919) 515-5321

Elis and Signe Olsson Professor and Graduate Alumni Distinguished Professor:
J. S. Gratzl

Reuben B. Robertson Professor and Graduate Alumni Distinguished Professor:
H.-m. Chang

Professors: J. Denig, J. A. Heitmann Jr., L. G. Jahn, H. Jameel, M. W. Kelly, H. G. Olf, E. A. Wheeler; *Adjunct Professors:* L. L. Edwards, T. W. Joyce, T. K. Kirk; *Professors Emeriti:* A. C. Barefoot Jr., E. L. Deal Jr., E. L. Ellwood, I. S. Goldstein, C. A. Hart, R. G. Pearson, R. J. Thomas; *Associate Professors:* B. Kasal, A. G. Kirkman, M. K. Ramasubramanian, J. P. Roise; *Research Associate Professor:* J. S. Stewart; *Adjunct Associate Professor:* R. B. Phillips; *Assistant Professors:* C. L. Forbes, J. F. Kadla, P. H. Mitchell, P. N. Peralta, R. A. Venditti; *Research Associate:* C. L. Chen

Course offerings and research facilities are available in the following areas: Wood chemistry, lignin and carbohydrate chemistry, pulping chemistry, process analysis, polymer chemistry, fiber and paper properties, secondary fiber studies, wood physics (especially wood liquid relations), wood anatomy, wood biology, wood mechanics and engineering, wood machining, manufacturing processes, wood-based industry economics and marketing.

Admission Requirements: Requirements listed here are in addition to graduate school requirements stated elsewhere. To be admitted, a student should have earned a B.S. degree with a major in wood and paper science or the equivalent. Graduates with other physical science or engineering baccalaureate degrees can be admitted but may be required to make up certain undergraduate deficiencies. Students with a 3.0 GPA and with appropriate course backgrounds will be considered for admission.

Master of Science Degree Requirements: In addition to Graduate School requirements, a minor is required.

Master of Wood and Paper Science Degree Requirements: The Master of Wood and Paper Science is a non-thesis, professional degree for students not interested in research. A minimum of 36 course credits is required. The regulations regarding

credits are the same as for the M.S. degree except that up to 6 credits of 400-level courses in the major field may be included. A technical report which demonstrates the student's ability to gather, analyze and report information is required.

Doctoral Degree Requirements: In addition to Graduate School requirements, Ph.D. candidates must present two seminars before their final oral examination will be arranged.

Student Financial Support: A limited number of research assistantships are available.

Other Relevant Information: Graduate students should select a chairman and other advisory committee members and submit a plan of graduate work by the end of their first semester of residence. They are also urged to take the qualifying examinations within one year of residence. The department believes M.S. and Ph.D. students should select a research topic and begin their thesis research as early as possible.

As the field of wood and paper science is a derived science, considerable emphasis is placed upon developing a strong minor in the graduate program in any one or more of the supporting disciplines such as organic chemistry, polymer chemistry, chemical engineering, mathematics, statistics, biology, engineering mechanics, mechanical engineering, physics, and economics or business administration.

Students in wood chemistry and pulp and paper programs must pass certain qualifying examinations.

GRADUATE COURSES

WPS(MAE) 534 Mechatronics Design.

WPS 591 Master's Seminar.

WPS 601 Seminar.

WPS 620 Special Problems.

WPS 625 Advanced Wood and Paper Science Problems.

WPS 685 Master's Supervised Teaching.

WPS 690 Master's Examination.

WPS 691 Methods of Research in Wood and Paper Science.

WPS 693 Master's Supervised Research.

WPS 695 Master's Thesis Research.

WPS 699 Master's Thesis Preparation.

WPS 704 Timber Physics.

WPS 713 Tropical Woods.

WPS 715 Surface and Colloid Chemistry of Papermaking.

WPS 721 Chemistry of Wood Polysaccharides.

WPS 722 Chemistry of Lignin and Extractives.

WPS 725 Pollution Abatement in Forest Products Industries.
WPS 733 Advanced Wood Anatomy.
WPS 740 Wood Composites.
WPS 750 Wastewater Treatment in the Paper Industry.
WPS 760 Advanced Pulp and Paper Process Analysis.
WPS 791 Doctoral Seminar.
WPS 801 Seminar.
WPS 820 Special Problems.
WPS 825 Advanced Wood and Paper Science Problems.
WPS 885 Doctoral Supervised Teaching.
WPS 890 Doctoral Preliminary Examination.
WPS 691 Methods of Research in Wood and Paper Science.
WPS 893 Doctoral Supervised Research.
WPS 895 Doctoral Dissertation Research.
WPS 899 Doctoral Dissertation Preparation.

Zoology

Degrees Offered: Ph.D., M.S., Master of Zoology, Master of Fisheries and Wildlife Sciences

GRADUATE FACULTY

Professor T. L. Grove, *Head of the Department*,
Professor B. J. Copeland, *Director of Graduate Programs*
 Box 7617, (919) 515-4589, bj_copeland@ncsu.edu

Professors: G. T. Barthalmus, B. L. Black, P. T. Bromley, P. D. Doerr, J. F. Gilliam, W. C. Grant, R. M. Grossfeld, H. F. Heatwole, C. F. Lytle, J. M. Miller, R. L. Noble, J. A. Rice, H. A. Underwood Jr., J. G. Vandenberg, T. G. Wolcott; *Adjunct Professors:* F. A. Cross, L. B. Crowder, J. D. Hair, D. E. Hoss, G. R. Huntsman, J. A. McLachlan, G. W. Thayer, J. R. Walters; *Professors Emeriti:* P. C. Bradbury, D. E. Davis, W. W. Hassler, D. W. Hayne, G. C. Miller, T. L. Quay, J. F. Roberts, D. E. Smith; *Associate Professors:* M. J. Groom, J. M. Hinshaw, R. G. Hodson, T. M. Losordo, S. C. Mozley, M. N. Niedzlek-Feaver, R. A. Powell, C. V. Sullivan, H. W. van der Veer; *Research Associate Professor:* R. R. H. Anholt; *Associate Professors (USDI):* J. A. Collazo, J. E. Hightower, T. R. Simons; *Adjunct Associate Professors:* W. J. Fleming, C. S. Manooch III; *Assistant Professors:* R. J. Borski, H. V. Daniels, J. Godwin, P. S. Rand; *Adjunct Assistant Professor:* E. M. Bennett

ASSOCIATE MEMBERS OF THE PROGRAM

Professors: E. J. Jones, R. A. Lancia, K. H. Pollock; **Assistant Professor:** B. H. Grimes

Areas of study include: cell biology and physiology, ecology and behavior, and fisheries and wildlife biology. Specializations within these areas include developmental biology, invertebrate biology, animal reproduction, biorhythms, behavioral ecology, population ecology, conservation biology, wildlife field studies, aquaculture and many others.

Admission Requirements: GRE scores (general) are required for admission. Biology Subject test recommended but not required. Regular admission requires an undergraduate grade point average of 3.0 in an appropriate biological discipline. Some research experience is highly recommended.

Master's Degree Requirements: M.S.: No more than 6 hours of temporary courses (ZO 624, ZO 824) or 2 hours of departmental seminar can be included in the 30-hour requirement for the M.S. Six hours of research credits (ZO 695) resulting in a thesis are required. A minor (usually 9-10 hours) is required. **Master of Zoology:** Of the 36 credit hours required, a minimum of four must be special problems and no more than two hours can be seminars. Other requirements may be imposed by the advisory committee.

Doctoral Degree Requirements: A student's advisory committee recommends appropriate courses which will provide a strong foundation in the student's area of interest. This typically includes 21-27 credit hours plus a minimum requirement of 10 hours of research (ZO 895) leading to a dissertation is required. A minor (usually 9-10 hours) is required.

Student Financial Support: Graduate teaching and research assistantships are available to well-qualified students.

Other Relevant Information: Students may also pursue degrees in interdepartmental programs in physiology and fisheries and wildlife biology. Excellent research facilities, equipment and computers are available. Field work can be conducted at nearby natural areas and laboratory work at various state and federal laboratories associated with the department.

GRADUATE COURSES

ZO 501 Ornithology.

ZO(PHY) 503 General Physiology I.

ZO(PHY) 504 General Physiology II.

ZO(ENT) 509 Ecology of Stream Invertebrates.
 ZO 512 Animal Symbiosis.
 ZO(PHY) 513 Comparative Physiology.
 ZO(FW) 515 Fish Physiology.
 ZO 519 Limnology.
 ZO 522 Biological Clocks.
 ZO 542 Herpetology.
 ZO 544 Mammalogy.
 ZO(MEA) 550 Principles of Biological Oceanography.
 ZO(FW) 553 Principles of Wildlife Science.
 ZO(FW) 554 Wildlife Field Studies.
 ZO(MB) 555 Protozoology.
 ZO 581 Helminthology.
 ZO(FW) 586 Aquaculture I.
 ZO(FW) 587 Aquaculture I Laboratory.
 ZO 590 Special Topics.
 ZO 601 Seminar.
 ZO(ANS,CBS,PHY) 602 Seminar in Biology of Reproduction.
 ZO 603 Aquatic Ecology Seminar.
 ZO 624 Topical Problems.
 ZO 631 Special Studies.
 ZO 685 Master's Supervised Teaching.
 ZO 690 Master's Examination.
 ZO 693 Master's Supervised Research.
 ZO 695 Master's Thesis Research.
 ZO 699 Master's Thesis Preparation.
 ZO(ST) 710 Sampling Animal Populations.
 ZO 714 Advanced Cell Biology.
 ZO 718 Community Ecology.
 ZO 721 Fishery Science.
 ZO(PHY,PO) 724 Comparative Endocrinology.
 ZO 726 Quantitative Fisheries Management.
 ZO(GN) 740 Evolution.
 ZO(MEA) 750 Marine Benthic Ecology.
 ZO(MEA) 754 Advances in Marine Community Ecology.
 ZO(MEA) 756 Ecology of Fishes.
 ZO(BO) 760 Principles of Ecology.
 ZO(BO) 770 Advanced Topics in Ecology I.
 ZO(ENT) 782 Medical and Veterinary Entomology.
 ZO 784 Advanced Topics in the Study of Mammals.
 ZO 789 Advanced Limnology.
 ZO 790 Special Topics.
 ZO 791 Topics in Animal Behavior.
 ZO(ANS,CBS,PHY) 802 Seminar in Biology of Reproduction.

- ZO 804 Seminar in Evolutionary Biology.**
- ZO 824 Topical Problems.**
- ZO 831 Special Studies.**
- ZO 885 Doctoral Supervised Teaching.**
- ZO 890 Doctoral Preliminary Examination.**
- ZO 893 Doctoral Supervised Research.**
- ZO 895 Doctoral Dissertation Research.**
- ZO 899 Doctoral Dissertation Preparation.**

MINOR AND OTHER ORGANIZED PROGRAMS OF STUDY

Anthropology (Minor Program)

The anthropology minor requires a total of nine hours of anthropology course work with at least six of those hours having been taken at NC State. These courses must be taught by at least two different professors.

GRADUATE COURSES

ANT 508 Culture and Personality.

ANT 511 Anthropological Theory.

ANT 512 Applied Anthropology.

ANT 516 Introduction to Qualitative Research Methods.

ANT 544 Cross-cultural Perspectives on Women.

ANT 610 Special Topics.

ANT 810 Special Topics.

Artificial Intelligence (Minor Program)

GRADUATE FACULTY

Professors: R. C. Luo, W. J. Rasdorf, H. E. Schaffer, A. L. Tharp; *Associate Professors:* D. R. Bahler, H. D. Levin, R. D. Rodman, E. T. Sanii; *Lecturer:* J. C. Sutton III

Artificial intelligence is the branch of computer science concerned with designing computer systems which exhibit the characteristics normally associated with intelligence in human behavior, such as understanding language, learning, reasoning, solving problems and so on. At NC State, artificial intelligence is an interdisciplinary field, with faculty from several departments engaged in fundamental research and applications.

The university offers courses of study leading to a minor in artificial intelligence as part of the M.S. and Ph.D. degrees. This option is available to all graduate students except those in computer science, who can choose artificial intelligence as an interest area.

To fulfill the academic requirements for a minor in artificial intelligence, each master's student must successfully complete at least three, and each doctoral student at least six, of the courses in the artificial intelligence curriculum. Two of the

courses must be CSC 520, Artificial Intelligence I and CSC 720, Artificial Intelligence II. Other courses offered as part of the artificial intelligence curriculum include: CSC 523 Computational Linguistics; CSC 723 Computational Semantics; ECE 763 Computer Vision; CSC(IE) 556 Voice Input/Output Communication Systems; CSC(IE) 756 Advances in Voice Input/Output Communication Systems. Also, from time to time special topics courses are offered covering subjects such as knowledge engineering, fuzzy reasoning, knowledge representation, artificial intelligence applications to CAD, and artificial intelligence in manufacturing.

Graduate students in computer science who select artificial intelligence as an interest area are subject to the same academic requirements that define other interest areas within computer science.

Biological Sciences

There is no separate graduate major in the biological sciences, but both M.S. and Ph.D. degrees are offered in several life science departments and programs of the College of Agriculture and Life Sciences. Interdisciplinary courses applicable to several graduate programs are offered by the Biological Sciences Interdepartmental Program.

GRADUATE COURSE

BIO 510 Advanced Biology for Secondary Teachers.

Biomedical Engineering (Minor Program)

GRADUATE FACULTY

Professors: C. F. Abrams, M. A. Ayoub, R. G. Carbonell, B. S. Gupta, J. J. Hren, C. Kleinstreuer, J. M. Mackenzie, T. K. Miller III, H. T. Nagle Jr., A. A. Nilsson, D. F. Ollis, H. G. Perros, S. A. Rajala, J. E. Smallwood, W. E. Snyder, L. Stikeleather, E. A. Stone, M. K. Stoskopf, D. E. Thrall, H. J. Trussell, T. G. Wolcott; **Adjunct Professor:** J. P. Archie; **Professors Emeriti:** F. M. Richardson, C. W. Suggs; **Associate Professors:** S. M. Blanchard, D. G. Bristol, R. D. Gould, L. C. Hudson, S. M. Hudson, R. E. Meyer, R. A. Powell, C. E. Smith, K. A. Spaulding; **Assistant Professor:** S. C. Roe

The biomedical engineering program provides graduate minors under the direction of faculty from fourteen departments in the Colleges of Agriculture and Life Sciences, Engineering, Forest Resources, Physical and Mathematical Sciences, Textiles and Veterinary Medicine at NC State. Faculty from the Biomedical

Engineering Departments at Duke University and the University of North Carolina at Chapel Hill are also actively involved. Graduate students from all departments may elect a biomedical engineering minor. To fulfill the minor requirements, a student must take three courses in one of four specialty tracks: biomechanics, biofluids and biomaterials; biomedical modeling and signal processing; instrumentation, sensors and telemetry; medical imaging and communications systems.

The graduate faculty maintain lists of courses from which the students may make their selections. The particular choice of courses is left to the student and the student's advisory committee. A student may choose a minor outside one of the four tracks with the approval of the Biomedical Engineering Academic Affairs Committee. The courses for all biomedical engineering graduate minors must be distinctly different from the student's major field of study.

Students who elect the biomedical engineering graduate minor are encouraged to engage in research activities that involve interactions with faculty and students in other departments and/or colleges.

Biotechnology (Minor Program)

GRADUATE FACULTY

Associate Professor M. A. Conkling, *Director*

Box 7512, (919) 515-4230, Fax (919) 151-4231, biotech@ncsu.edu

Home page: <http://www2.ncsu.edu/ncsu/CIL/biotech>

Professors: K. B. Adler, P. F. Agris, N. S. Allen, W. F. Boss, R. G. Carbonell, P. B. Carter, S. E. Curtis, M. E. Daub, E. Davies, V. L. DeBuysscher, W. J. Dobrogosz, E. J. Eisen, F. J. Fuller, C. K. Hall, B. B. Hammerberg, H. M. Hassan, R. M. Kelly, T. R. Klaenhammer, C. S. Levings III, D. H. Ley, R. J. Linderman, S. A. Lommel, J. M. Mackenzie, E. S. Maxwell, W. L. Miller, J. W. Moyer, D. F. Ollis, P. E. Orndorff, G. A. Payne, R. M. Petters, M. A. Qureshi, R. M. Roe, P. L. Sannes, J. G. Scandalios, R. R. Sederoff, J. C. H. Shih, R. C. Smart, S. L. Spiker, H. T. Stalker Jr., H. E. Swaisgood, C. Teng, M. B. Tompkins, W. A. F. Tompkins, B. S. Weir; *Professor (USDA):* P. E. Bishop; *Adjunct Professor:* T. Melton; *Associate Professors:* B. P. Alston-Mills, H. V. Amerson, M. T. Andrews, R. S. Boston, E. F. Bowden, S. D. Clouse, M. A. Conkling, R. E. Dewey, C. E. Farin, L. K. Hanley-Bowdoin, C. L. Hemenway, T. J. Hoban, P. K. Kilpatrick, S. M. Laster, P. B. Lindgren, J. W. Mahaffey, M. B. McCaw, E. S. Miller, C. H. Opperman, S. W. Peretti, J. N. Petite, I. T. D. Petty, J. B. Ristaino, D. Robertson, B. Sherry, A. M. Stomp, S. L. Tonkonogy, A. K. Weissinger; *Assistant Professor:* P. Arasu, J. W. Brown, E. L. David, B. Goldfarb, L.-A. Jaykus, D C. Sellon, B. M. Wiegmann

The Biotechnology Program includes faculty from twenty departments in the Colleges of Agriculture and Life Sciences, Engineering, Forest Resources, Physical and Mathematical Sciences, and Veterinary Medicine. Graduate study leading to either an M.S. minor or a Ph.D. minor in biotechnology may be taken by students who reside and conduct their research in one of the participating departments. To obtain a minor in biotechnology, the student must successfully complete at least six credit hours in the laboratory core courses selected from the list below and must conduct graduate thesis research in an area of biotechnology.

Research in biotechnology is focused in three main areas: recombinant DNA technology, bioprocessing/bioanalytical techniques, and *in vitro* culture techniques. The multidisciplinary nature of biotechnology means that a wide range of research topics and techniques are applicable, such as molecular level genetics and associated research in molecular biology, enzyme technology and protein engineering, bioprocessing using cells or enzymes, development of biosensors, hybridoma technology, cell culture techniques and embryo manipulation.

GRADUATE COURSES

BIT 810 Core Technologies in Molecular and Cellular Biology.

BIT 815 Advanced Special Topics.

COURSES FROM ASSOCIATE DEPARTMENTS

ANS 706 Animal Biotechnology: Embryo Manipulation.

BCH 552 Experimental Biochemistry.

FS 704 Food Proteins and Enzymes.

MB 760 Experimental Microbial Genetics.

Business Management (Minor Program)

GRADUATE FACULTY

Professor J. W. Wilson, Head

Professor S. G. Allen, Director of Graduate Programs

Professors: S. H. Barr, R. L. Clark, G. W. Dickson, C. P. Jones; ***Associate Professors:*** A. Agrawal, D. L. Baumer, S. N. Chapman, J. C. Dutton Jr., E. A. McDermid, K. Mitchell, A. Padilla, J. C. Poindexter Jr.; ***Assistant Professors:*** L. Aiman-Smith, C. C. Bozarth, K. S. Davis, J. B. Earp, S. K. Markham, J. K. McCreery, P. W. Mulvey, M. Montoya-Weiss, K. D. Schenk, G. B. Voss, G. S. Young

The department offers a graduate minor in business management. Students enrolled in master's programs other than the Master of Science in Management may earn a minor by successfully completing nine hours of courses in the department at the 500 or 600 level. For a listing of courses in business management, see management.

Communication

GRADUATE COURSES

- COM(ENG) 514 History of Rhetoric.
- COM(ENG) 516 Rhetorical Criticism: Theory and Practice.
- COM 556 Seminar in Organizational Communication.
- COM 566 Seminar in Crisis Communication.
- COM 598 Special Topics in Communication.
- COM 630 Independent Study.
- COM 661 Human Communication Theory.
- COM 685 Master's Supervised Teaching.

Computational Engineering and Sciences (Minor Program)

GRADUATE FACULTY

Professor P. J. Turinsky, *Program Coordinator*

Professors: D. P. Agrawal, W. E. Alexander, H. T. Banks, J. Bernholc, S. R. Cotanch, R. E. Funderlic, C. K. Hall, C. Kleinstreuer, D. F. McAllister, D. S. McRae, T. K. Miller III, G. E. Mitchell, J. F. Monahan, H. G. Perros, R. O. Scattergood, W. J. Stewart, M. A. Vouk, M. H. Whangbo, R. E. White, J. L. Whitten; *Associate Professors:* J. W. Baugh, D. W. Brenner, J. M. Doster, J. E. Franke, E. F. Gehringer, C. R. Ji, S. E. Koch, Y.-L. Lin; *Assistant Professor:* T. M. Conte

The Computational Engineering and Sciences Program includes faculty from twelve departments in the College of Engineering and College of Physical and Mathematical Sciences. Graduate students pursuing graduate study toward a master's or Ph.D. degree in one of the participating science or engineering departments may elect this program in place of the traditional minor. [Note that students wishing to earn a graduate degree in mathematics or computer science should reference these departments' sections of the Graduate Catalog for details on options available in computational mathematics and scientific computing.] To complete the program requirements, a student must successfully complete a sequence of graduate-level applied mathematics and computer science courses and, if a research dissertation is required, utilize advanced computational techniques in the course of conducting the research.

The Computational Engineering and Sciences Program is designed to efficiently prepare graduate students to undertake research utilizing scientific computing by combining course work in applied mathematics and computer science in addition to course work in the traditional major. The program recognizes that a new area of scientific pursuit, numerical simulation, has emerged as a new paradigm for scientific inquiry complementing theory and laboratory experiment. Typical areas of research include, but are not limited to, computational fluid dynamics, quantum chemistry and atmospheric modelling. Admission to the program is gained after enrollment in the Graduate School and the graduate program is underway. Program course requirements are selected from applied mathematics and computer science courses listed elsewhere in this Graduate Catalog. To facilitate the satisfaction of prerequisite requirements for graduate-level computer science courses, CSC 489 is offered for graduate credit, combining the key contents of several undergraduate courses. Typical courses that may be selected to satisfy this program's requirements include advanced calculus, numerical analysis, numerical linear algebra for parallel architectures, stochastic simulation, computer operating systems, digital systems architecture, computer graphics, compiler construction, software engineering, and design and analysis of algorithms.

Design

For a listing of graduate faculty and program information, see architecture, graphic design, industrial design and landscape architecture.

GRADUATE COURSE

DN 502 Advanced Visual Laboratory.

Education [General Courses]

GRADUATE COURSES

ED(AEE) 501 Foundations of Agricultural and Extension Education.

ED(AEE) 530 Priority Management in Agricultural and Extension Education.

ED(AEE) 641 Practicum in Agricultural and Extension Education.

ED(AEE) 735 Effective Teaching in Agriculture and Life Sciences.

ED(AEE) 841 Practicum in Agricultural and Extension Education.

Engineering [General Courses] (Designed for use by graduate students in any department in the College of Engineering.)

GRADUATE COURSES

E(MA,OR) 531 Dynamic Systems and Multivariable Control I.

E(MA,OR) 731 Dynamic Systems and Multivariable Control II.

Foreign Languages and Literatures

GRADUATE FACULTY

Professor L. R. Schehr, Head of the Department

Professors: G. F. Gonzalez, J. R. Kelly, G. G. Smith, M. L. Sosower, J. H. Stewart, M. A. F. Witt; *Professors Emeriti:* A. A. Gonzalez, M. Paschal, G. W. P. land, E. M. Stack; *Associate Professors:* R. M. A. Alder, S. G.-Q. Alonso, V. Bilenkin, H. G. Braunbeck, G. A. Dawes, M. M. Magill, A. C. Malinowski, D. M. Marchi, L. Mykyta, M. L. Salstad; *Associate Professors Emeriti:* W. M. Holler, S. E. Simonsen, H. Tucker Jr.; *Assistant Professors:* J. M. Levis, J. P. Mertz, G. P. P. Meyjes

The Department of Foreign Languages and Literatures offers courses to assist graduate students in preparing to use modern foreign languages in research and advanced study. These courses are not open to undergraduates. With special permission of the Graduate School, certification may be obtained in languages not normally taught by the department.

The following courses are designed to be audited, and credits do not apply toward advanced degrees.

FLF 401 French for Graduate Students.

FLG 401 German for Graduate Students.

FLS 401 Spanish for Graduate Students.

Multidisciplinary Studies

GRADUATE COURSES

MDS 595 Special Topics in Multidisciplinary Studies.

MDS 610 Special Topics.

MDS 685 Master's Supervised Teaching.

Philosophy

GRADUATE COURSES

PHI(PSY) 525 Introduction to Cognitive Science.

PHI 635 Advanced Independent Study in Philosophy.

PHI 798 Advanced Topics in Philosophy.

Plant Physiology

GRADUATE FACULTY

Professor T. W. Rufty Jr., *Coordinator*

Box 7619, (919) 515-3660

Professors: N. S. Allen, S. M. Blankenship, W. F. Boss, W. S. Chilton, M. A. Conkling, F. T. Corbin, R. C. Fites, J. Huang, M. M. Peet, D. M. Pharr, C. D. Raper Jr, E. C. Sisler, S. L. Spiker, W. F. Thompson, R. J. Volk; *Professors (USDA):* E. L. Fiscus, S. C. Huber, D. W. Israel, R. F. Wilson; *Professor Emeritus:* D. E. Moreland; *Associate Professors:* H. V. Amerson, R. S. Boston, D. C. Bowman, J. D. Burton, S. D. Clouse, R. E. Dewey, G. P. Fenner, P. B. Lindgren, D. Robertson, R. Wells; *Associate Professors (USDA):* K. O. Burkey, D. P. Livingston; *Assistant Professor:* I. D. Williamson; *Research Assistant Professor:* R. Whetten

The plant physiology program is an interdepartmental offering. Although not a formal degree program, students may elect to major or minor in the plant physiology program at both the M.S. and Ph.D. levels. Students entering the program should have appropriate knowledge in plant biology, chemistry, mathematics and physics. Some formal training in genetics and statistics is normally expected.

When majoring in plant physiology, students will be closely affiliated with the same department as their major professor. As such, they will be required to meet respective departmental requirements for teaching, written and oral examinations, and seminar attendance. Departments currently participating in this program are: biochemistry, botany, crop science, forestry, genetics, horticultural science, plant pathology and soil science. The chair or co-chair of the student's advisory committee must be a member of the Plant Physiology Faculty.

The program is administered by the Plant Physiology Executive Committee. Additional information about the program may be obtained by writing to one of the listed faculty members or to the coordinator.

The purpose of the plant physiology curriculum is to ensure that students obtain substantive understanding of the physiological processes controlling plant behavior. The course requirements for graduate students are set by each graduate committee. Advanced knowledge is expected in plant physiology, biochemistry, structure and function, and molecular biology. Acceptable achievement most often occurs with successful completion of the following courses:

BO 751 Advanced Plant Physiology I

BO 752 Advanced Plant Physiology II

BCH 610N Special Topics: Regulation of Intermediary Metabolism in Eucaryotes

BO 624D Topical Problems: Plant Cell Biology

Political Science and Public Administration

Professor M. S. Soroos, Head of the Department

For listings of graduate faculty and information about the two programs, see the political science section and the public administration section.

Religion

GRADUATE COURSE

REL(HI) 560 American Religion after Darwin.

Solid State Sciences (Minor Program)

GRADUATE FACULTY

University Professor G. Lucovsky, Chair

Professors: K. J. Bachmann, S. M. Bedair, J. Bernholc, R. F. Davis, R. E. Fornes, J. R. Hauser, J. J. Hren, M. A. Littlejohn, R. M. Kolbas, J. Narayan, R. J. Nemanich, M. A. Paesler, G. Rozgonyi, P. E. Russell, D. E. Sayers, J. F. Schetzina, A. F. Schreiner, E. O. Stejskal, M. H. Whangbo, J. J. Wortman

The university offers courses of study leading to a minor in solid state sciences as part of the M.S. and the Ph.D. degrees. This option is available to all graduate students pursuing research in the broad area of solid state science and requires that a member of the solid state sciences faculty serve on the student's research committee.

Solid state sciences is an interdisciplinary area of research that applies and extends concepts from the traditional academic disciplines of chemistry, electrical and computer engineering, materials science and engineering, and physics to basic and applied problems with a primary focus on solid state materials. At NC State, there are a significant number of such research programs that involve faculty and students in more than one of the academic departments listed above. This minor program can be customized to provide a course complement for these ongoing programs, as well as for any additional solid state materials research programs as they are initiated, developed and implemented.

To fulfill the academic requirements for a minor in solid state sciences, each master's student must successfully complete at least three, and each doctoral student, four of the courses in the solid states sciences curriculum. A partial listing of courses in this program includes: CH 701, 703 Advanced Inorganic Chemistry I, II; CH 731 Chemical Thermodynamics; CH 733 Chemical Kinetics; CH 737 Quantum Chemistry; ECE 730 Physical Electronics; ECE 739 Integrated Circuit Technology and Fabrication; ECE 723 Optical Properties of Semiconductors; ECE 724 Electronic Properties of Solid State Devices; ECE (PY) 727 Semiconductor Thin Films Technology; MAT 712 Scanning Electron Microscopy; MAT 715 Fundamentals of Transmission Electron Microscopy; MAT 560 Materials Science and Processing of Semiconductor Devices; MAT 795 Advanced Materials Experiments; MAT 722 Advanced Scanning Electron Microscopy and Surface Analysis; MAT 770 Defects, Diffusion and Ion Implantation in Semiconductors; MAT 792 Advanced Topics in Materials Science and Engineering; PY (ECE) 552 Introduction to the Structure of Solids. In addition, other courses (for example, special topics courses in any one of the participating departments) may also be substituted into an individual student's designated solid state sciences minor program at the discretion of his/her committee.

Water Resources (Minor Program)

WATER RESOURCES COMMITTEE

J. D. Gregory, *Chair*

Box 8008, (919) 515-7567, E-mail: jim_gregory@ncsu.edu

J. E. Parsons (Biological and Agricultural Engineering), J. M. Burkholder (Botany), M. R. Overcash (Chemical Engineering), R. C. Borden (Civil Engineering), J. B. Weber (Crop Science), R. B. Palmquist (Economics), F. P. Hain (Entomology), K. M. Keener (Food Science), S. R. Raval (Landscape Architecture), D. G. Evans (Marine, Earth and Atmospheric Sciences), J. W. Gilliam (Soil Science), C. B. Smith (Textile Engineering, Chemistry and Science), S. C. Mozley (Zoology)

The graduate minor in water resources is an interdisciplinary, interdepartmental minor that is designed to provide a specialization in water resources for students who are majoring in the many disciplines of natural resources, engineering, technology and social sciences that are related to or involve water management. The graduate minor in water resources will expose students to several different courses and faculty members in water resources that are outside his/her major field of study.

A graduate student may enroll in the water resources minor by including it on the plan of graduate work. A graduate faculty member from outside the student's major department or program must be appointed to serve as the minor representative on his/her advisory committee. The minor representative may be a member of the Water Resources Committee or another faculty member from a department represented on the Water Resources Committee who is active in teaching/research related to water resources. The minimum course requirements for a graduate minor in water resources are described below.

Master's Degree --Three courses (minimum of eight credit hours) from water resources areas outside the student's major field of study approved by the student's minor representative. **Doctor of Philosophy Degree** --Three courses (minimum of eight credit hours) from water resources areas outside the student's major field of study approved by the student's minor representative. These courses shall be in addition to those previously taken at the master's level when that degree included a Water Resources Minor. Recommended Course--A course in the legal, institutional, or economic aspects of water resources recommended for each minor program. Contact J. D. Gregory for a list of recommended courses.

Women's and Gender Studies (Minor Program)

GRADUATE FACULTY

Associate Professor L. R. Severin, *Director*

Professors: N. S. Allen, J. A. Anderson, S. D. Brandeis, J. Ferster, C. M. Pierce, T. H. Regan, L. R. Schehr, M. Scotford, J. D. Smith, D. Tomaskovic-Devey, M. A. Witt; **Associate Professors:** M. A. Atkinson, L. E. Baker-Ward, M. E. Barbercheck, H. G. Braunbeck, J. K. Cunningham, V. J. Gallagher, T. N. Greenstein, C. Gross, A. G. Halberstadt, D. Laryea, M. M. Magill, J. E Morrison, L. A. Mykyta, R. Leonard, M. E. Orr, E. O'Sullivan, J. O. Pettis, B. J. Risman, T. L. Robinson, M. L. Schwalbe, S. L. Spencer, M. S. Thompson, P. Tyler, C. R. Zimmer; **Assistant Professors:** R. S. Ellovich, C. R. Haller, D. E Keetley, A. F. Khater, L. S. May, M. T. Pramaggiore, S. M. Setzer, K. Shepherd-Barr, S. M. Stein, C. Warren, S. T. Warren

The minor provides graduate students in the humanities, social sciences and sciences with the theories and the methodologies to study women and gender relations. The minor is intended to support and further students' research in their own field. Nine hours of graduate credit are required. Students may choose from the courses listed below and/or a list of approved special topics courses.

COURSES

ECD 540 Gender Issues in Counseling
HI 547 American Women to 1900
HI 548 American Women in the 20th Century
SOC 737 Sociology of Gender
SOC 739 Social Psychology of Inequality

GRADUATE FACULTY*

- Abbate, Angelo Rudy, M.L.A., Professor of Landscape Architecture.
- Abrams, Charlie Frank, Jr., Ph.D., Professor of Biological and Agricultural Engineering.
- Abt, Robert C., Ph.D., Associate Professor of Forestry.
- Adams, David Arthur, Ph.D., Professor Emeritus of Forestry.
- Adams, Dewey Allen, Ed.D., Professor Emeritus of Mathematics, Science and Technology Education.
- Adams, John Peter, Ph.D., Adjunct Professor of Food Science.
- Adams, William M., V.M.D., Professor Emeritus of Veterinary Medicine.
- Ade, Harald W., Ph.D., Associate Professor of Physics.
- Adler, Kenneth B., Ph.D., Professor of Veterinary Medicine.
- Afify, Elsayed M., Ph.D., Professor of Mechanical and Aerospace Engineering.
- Agrawal, Anup, Ph.D., Associate Professor of Business Management.
- Agrawal, Dharma Prakash, D.Sc., Professor of Electrical and Computer Engineering.
- Agris, Paul F., Ph.D., Professor of Biochemistry.
- Ahmad, Shuaib Haroon, Ph.D., Professor of Civil Engineering.
- Aiman-Smith, Lynda, Ph.D., Assistant Professor of Business Management.
- Akroyd, H. Duane, Ph.D., Associate Professor of Adult and Community College Education.
- Alder, Ruth M. Ayend, Ph.D., Associate Professor of Foreign Languages and Literatures.
- Alexander, Samuel Thomas, Ph.D., Associate Professor of Electrical and Computer Engineering.
- Alexander, Winser E., Ph.D., Professor of Electrical and Computer Engineering.
- Alibrandi, Marsha L., Ed.D., Assistant Professor of Curriculum and Instruction.
- Allen, Howard Lee, Jr., Ph.D., Carl Alwin Schenck Professor of Forestry.
- Allen, Janice Benson, Ph.D., Research Assistant Professor of Anatomy, Physiology and Radiology.
- Allen, Jonathan C., Ph.D., Professor of Food Science.
- Allen, Nina Stromgren, Ph.D., Professor of Botany.
- Allen, Steven G., Ph.D., Professor of Business Management.
- Allen, William D., Ph.D., Visiting Assistant Professor of Electrical and Computer Engineering.
- Almond, Glen W., Ph.D., Professor of Food Animal and Equine Medicine.
- Alonso, Silvia Gonzalez-Quevedo, Ph.D., Associate Professor of Foreign Languages and Literatures.
- Alston-Mills, Brenda P., Ph.D., Associate Professor of Animal Science.
- Altier, Craig, Ph.D., Assistant Professor of Microbiology, Pathology and Parasitology.
- Alvarez, Raul, Professor Emeritus of Industrial Engineering.
- Ambrose, John Thomas, Ph.D., Professor of Entomology.

Membership in the Graduate Faculty may be in either of two categories: (1) full status or (2) associate status. Full status permits a faculty member to engage in any and all phases of the graduate programs of the University. Associate members may teach courses at the graduate level and serve as chair of master's advisory committees.

Amein, Michael, Professor Emeritus of Civil Engineering.
 Amerson, Henry Van, Ph.D., Associate Professor of Forestry.
 Amiran, Eyal Yosef, Ph.D., Associate Professor of English.
 Amoozegar, Aziz, Ph.D., Professor of Soil Science.
 Anderson, Charles Eugene, Ph.D., Professor Emeritus of Botany.
 Anderson, Clifton A., Ph.D., Professor Emeritus of Industrial Engineering.
 Anderson, James Alan, Ph.D., Professor of Counselor Education.
 Anderson, Kenneth E., Ph.D., Associate Professor of Poultry Science.
 Anderson, Kevin Lindsay, Ph.D., Professor of Food Animal and Equine Medicine.
 Anderson, Marshall W., Ph.D., Adjunct Professor of Statistics.
 Anderson, Norman Dean, Ph.D., Professor Emeritus of Mathematics, Science and Technology Education.
 Andrews, Matthew T., Ph.D., Associate Professor of Genetics.
 Aneja, Viney P., Ph.D., Research Professor of Marine, Earth and Atmospheric Sciences.
 Anholt, Robert Rene Henri, Ph.D., Research Associate Professor of Zoology.
 Aparicio, Manuel, IV, Ph.D., Adjunct Assistant Professor of Computer Science.
 Apperson, Charles Smith, Ph.D., Professor of Entomology.
 Apple, Jay Lawrence, Ph.D., Professor Emeritus of Genetics.
 Arasu, Prema, Ph.D., Assistant Professor of Microbiology, Pathology and Parasitology.
 Archie, Joseph Patrick, Jr., Ph.D., Adjunct Professor of Mechanical and Aerospace Engineering.
 Argenzio, Robert Alan, Ph.D., Professor of Anatomy, Physiology, and Radiology.
 Armstrong, Frank Bradley, Ph.D., Professor Emeritus of Biochemistry.
 Arnold, John F., Ph.D., Associate Professor Emeritus of Curriculum and Instruction.
 Aronson, Arthur L., Ph.D., Professor of Anatomy, Physiology, and Radiology.
 Arya, Satya Pal Singh, Ph.D., Professor of Marine, Earth and Atmospheric Sciences.
 Ash, Sarah Liberman, Ph.D., Visiting Assistant Professor of Animal Science.
 Aspnes, David E., Ph.D., Professor of Physics.
 Atchley, William R., Ph.D., William Neal Reynolds Professor of Genetics.
 Atkins, Clarke E., D.V.M., Professor of Companion Animal and Special Species Medicine.
 Atkinson, Maxine P., Ph.D., Associate Professor of Sociology and Anthropology.
 Attarian, Aram, Ph.D., Associate Professor of Parks, Recreation and Tourism Management.
 Auciello, Orlando Hector, Ph.D., Adjunct Professor of Materials Science and Engineering.
 Aurand, Leonard William, Ph.D., Professor Emeritus of Food Science.
 Austin, David F., Ph.D., Associate Professor of Philosophy and Religion.
 Austin, William Wyatt, Jr., Ph.D., Professor Emeritus of Materials Science and Engineering.
 Averre, Charles Wilson, III, Ph.D., Professor Emeritus of Plant Pathology.
 Avva, Vishnu S., Ph.D., Interinstitutional Adjunct Graduate Faculty in Mechanical and Aerospace Engineering.
 Axtell, Richard Charles, Ph.D., Professor Emeritus of Entomology.
 Aycock, Robert, Ph.D., Professor Emeritus of Plant Pathology.
 Ayoub, Mahmoud Amin, Ph.D., Professor of Industrial Engineering.

Azmy, Yousry R., Ph.D., Adjunct Associate Professor of Nuclear Engineering.
 Bacheler, Jack S., Ph.D., Professor of Entomology.
 Bachmann, Klaus Jurgen, Ph.D., Professor of Materials Science and Engineering.
 Bahler, Dennis R., Ph.D., Associate Professor of Computer Science.
 Bai, Stephen A., Ph.D., Associate Professor of Anatomy, Physiology, and Radiology.
 Bailey, Douglas A., Ph.D., Professor of Horticultural Science.
 Bailey, Jack Eugene, Ph.D., Professor of Plant Pathology.
 Bailey, John Albert, Ph.D., Professor of Mechanical and Aerospace Engineering.
 Bailey, Kermit Lavon, M.P.D., Associate Professor of Graphic Design.
 Baines, Barbara Joan, Ph.D., Professor of English.
 Baker, George A., III, Ed.D., Joseph D. Moore Distinguished Professor of Adult and Community College Education.
 Baker, James Robert, Ph.D., Professor of Entomology.
 Baker, Stanley B., Ph.D., Professor of Counselor Education.
 Baker-Ward, Lynne Elizabeth, Ph.D., Associate Professor of Psychology.
 Bakst, Murray R., Ph.D., Adjunct Professor of Poultry Science.
 Baliga, B. Jayant, Ph.D., Distinguished University Professor of Electrical and Computer Engineering.
 Balik, Charles Maurice, Ph.D., Associate Professor of Materials Science and Engineering.
 Ball, David Stafford, Ph.D., Associate Professor of Business Management.
 Ball, Hershell Ray, Jr., Ph.D., Professor Emeritus of Food Science.
 Ballinger, Walter Elmer, Ph.D., Professor Emeritus of Horticultural Science.
 Ballington, James Ralph, Jr., Ph.D., Professor of Horticultural Science.
 Banker, James Roderick, Ph.D., Professor of History.
 Banks, Alton J., Ph.D., Professor of Chemistry.
 Banks, Harvey Thomas, Ph.D., Drexel Professor and University Professor of Mathematics.
 Banks-Lee, Pamela, Ph.D., Associate Professor of Textile and Apparel, Management and Technology.
 Baran, Mesut Ethem, Ph.D., Assistant Professor of Electrical and Computer Engineering.
 Barbercheck, Mary E., Ph.D., Associate Professor of Entomology.
 Barclay, William John, Ph.D., Professor Emeritus of Electrical and Computer Engineering.
 Barefoot, Aldos Cortez, Jr., D.F., Professor Emeritus of Liberal Studies.
 Barker, James Cathey, Ph.D., Professor of Biological and Agricultural Engineering.
 Barker, Kenneth Reece, Ph.D., Professor of Plant Pathology.
 Barker, Roger Lee, Ph.D., Professor of Textile Engineering, Chemistry, and Science.
 Barkley, Key Lee, Ph.D., Professor Emeritus of Psychology.
 Barlaz, Morton A., Ph.D., Associate Professor of Civil Engineering.
 Barnes, Donald Warren, Jr., Ph.D., Associate Professor Emeritus of Architecture.
 Barnes, Harold John, Ph.D., Professor of Food Animal and Equine Medicine.
 Barnett, Ortus Webb, Jr., Ph.D., Professor of Plant Pathology.
 Barnhardt, Robert Alexander, Ed.D., Professor of Textile and Apparel, Management and Technology.
 Barr, Steve H., Ph.D., Professor of Business Management.
 Barrax, Gerald W., M.A., Professor Emeritus of English.

Barrick, Reese E., Ph.D., Visiting Assistant Professor of Marine, Earth and Atmospheric Sciences.

Barthalmus, George Timothy, Ph.D., Professor of Zoology.

Bartholomew, William Victor, Ph.D., Professor Emeritus of Soil Science.

Bartley, Jon W., Ph.D., Professor of Accounting.

Batchelor, Peter, M.C.P., Professor of Architecture.

Bateman, Durward F., Ph.D., Professor Emeritus of Plant Pathology.

Batra, Subhash K., Ph.D., Professor of Textile Engineering, Chemistry, and Science.

Batte, Edward Guy, D.V.M., Professor Emeritus of Microbiology, Pathology, and Parasitology.

Baugh, John Wesley, Jr., Ph.D., Associate Professor of Civil Engineering.

Baughman, Gerald Robert, Ph.D., Associate Professor of Biological and Agricultural Engineering.

Baumer, David L., Ph.D., Associate Professor of Business Management.

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Beasley, David Beach, Ph.D., Professor of Biological and Agricultural Engineering.

Beasley, Mark S., Ph.D., Assistant Professor of Accounting.

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Beckmann, Robert L., Ph.D., Associate Professor of Botany.

Bedair, Salah Mohamed, Ph.D., Professor of Electrical and Computer Engineering.

Beers, Burton Floyd, Ph.D., Professor of History.

Beezer, Bruce Gerald, Ed.D., Professor of Educational Leadership and Program Evaluation.

Behlow, Robert Frank, D.V.M., Professor Emeritus of Animal Science.

Behnke, Wallace P., B.S., Adjunct Associate Professor of Textile Engineering, Chemistry, and Science.

Beichner, Robert, Ph.D., Associate Professor of Physics.

Beith, Barry H., Ph.D., Adjunct Assistant Professor of Psychology.

Bell, Thomas Alexander, M.S., Professor Emeritus of Food Science.

Bennett, Elizabeth M., D.Ed., Adjunct Assistant Professor of Zoology.

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Benson, Geoffrey Alan, Ph.D., Associate Professor of Economics and Business.

Benson, Ray Braman, Jr., Ph.D., Professor of Materials Science and Engineering.

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Bereman, Robert Deane, Ph.D., Professor of Chemistry.

Berenson, Sarah Burke, Ph.D., Professor of Mathematics, Science and Technology Education.

Berger, Roger L., Ph.D., Professor of Statistics.

Berger, Vicki L., Ph.D., Adjunct Assistant Professor of History.

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Bernhole, Jerzy, Ph.D., Professor of Physics.

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Berry, Clifford R., D.V.M., Associate Professor of Anatomy, Physiology, and Radiology.

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Bettis, Jerry Lamont, Sr., Ph.D., Assistant Professor of Forestry.

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Beute, Marvin Kenneth, Ph.D., Professor Emeritus of Plant Pathology.

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Bhattacharyya, Bibhuti Bhushan, Ph.D., Professor of Statistics.

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Bilderback, Theodore Eugene, Ph.D., Professor of Horticultural Science.

Bilenkin, Vladimir, Ph.D., Associate Professor of Foreign Languages and Literatures.

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Bingham, William Louis, Ph.D., Associate Professor of Civil Engineering.

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Bireline, George Lee, M.A., Professor Emeritus of Design.

Bishir, John William, Ph.D., Professor of Mathematics.

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Bitting, Paul F., Ph.D., Associate Professor of Adult and Community College Education.

Bitzer, Donald Lester, Ph.D., Distinguished University Research Professor of Computer Science.

Bizios, Georgia, M.Arch., Professor of Dean's Office - Design.

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Blank, Philip Everett, Jr., Ph.D., Professor Emeritus of English.

Blankenship, Sylvia M., Ph.D., Professor of Horticultural Science.

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Blazich, Frank Arthur, Ph.D., Professor of Horticultural Science.

Blikslager, Anthony T., Ph.D., Research Assistant Professor of Food Animal and Equine Medicine.

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Blondin, John M., Ph.D., Associate Professor of Physics.

Bloomfield, Peter, Ph.D., Professor of Statistics.

Blum, Udo, Ph.D., Professor of Botany.

Blumer, Thomas Nelson, Ph.D., Professor Emeritus of Food Science.

Bogdan, John Francis, B.T., Professor Emeritus of Textile Engineering, Chemistry, and Science.

Boles, Michael A., Ph.D., Associate Professor of Mechanical and Aerospace Engineering.

Bond, James Anthony, Ph.D., Adjunct Professor of Toxicology.

Bonham, Julia C., Ph.D., Visiting Assistant Professor of History.

Boone, Edgar John, Ph.D., Professor of Adult and Community College Education.

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Boos, Dennis Dale, Ph.D., Professor of Statistics.

Borden, Robert C., Ph.D., Professor of Civil Engineering.

Borden, Roy H., Ph.D., Professor of Civil Engineering.

Borski, Russell J., Ph.D., Assistant Professor of Zoology.

Boss, Charles Ben, Ph.D., Associate Professor of Chemistry.

Boss, Wendy Farmer, Ph.D., Professor of Botany.

Bostian, Carey Hoyt, Ph.D., Professor Emeritus of Genetics.

Bostick, George W., Jr., Ed.D., Professor of Agricultural and Extension Education.

Boston, Rebecca S., Ph.D., Professor of Botany.

Bottcher, Robert William, Ph.D., Professor of Biological and Agricultural Engineering.

Bottomley, Laura J., Ph.D., Adjunct Assistant Professor of Electrical and Computer Engineering.

Bourham, Mohamed A., Ph.D., Professor of Nuclear Engineering.

Bowden, Edmond Francis, Ph.D., Professor of Chemistry.

Bowen, Henry Dittimus, Ph.D., Professor Emeritus of Biological and Agricultural Engineering.

Bowen, Lawrence Hoffman, Ph.D., Professor of Chemistry.

Bowers, Crowell Gattis, Jr., Ph.D., Professor of Biological and Agricultural Engineering.

Bowman, Daniel Clark, Ph.D., Associate Professor of Crop Science.

Bowman, Daryl Thomas, Ph.D., Professor of Crop Science.

Bowman, Karl Frederick, D.V.M., Associate Professor of Food Animal and Equine Medicine.

Boyd, Leon C., Ph.D., Associate Professor of Food Science.

Boyette, Michael Doyle, Ph.D., Associate Professor of Biological and Agricultural Engineering.

Bozarth, Cecil C., Ph.D., Associate Professor of Business Management.

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Bradley, Julius Roscoe, Jr., Ph.D., Professor of Entomology.

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Braham, Roscoe R., Ph.D., Scholar in Residence in Marine, Earth and Atmospheric Sciences.

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Branch, Stacy, Ph.D., Assistant Professor of Toxicology.

Brandeis, Susan Dowman, M.F.A., Professor of Design.

Brandenburg, Rick Lynn, Ph.D., Professor of Entomology.

Brandt, Jon A., Ph.D., Professor of Economics and Business.

Branson, Bruce C., Ph.D., Associate Professor of Accounting.

Braunbeck, Helga Gerlinde, Ph.D., Associate Professor of Foreign Languages and Literatures.

Breitschwerdt, Edward Bealmear, D.V.M., Professor of Companion Animal and Special Species Medicine.

Brenner, Donald W., Ph.D., Associate Professor of Materials Science and Engineering.
 Breuhaus, Babetta Ann, Ph.D., Associate Professor of Food Animal and Equine Medicine.
 Brewer, Holly, Ph.D., Assistant Professor of History.
 Brglez, Franc, Ph.D., Visiting Professor of Electrical and Computer Engineering.
 Brickley, James John, Ph.D., Visiting Associate Professor of Electrical and Computer Engineering.
 Bridgwater Jr., Floyd Emmitt, Ph.D., Professor (USDA) of Forestry.
 Brill, Earl Downey, Jr., Ph.D., Professor of Civil Engineering.
 Brim, Charles Aloysius, Ph.D., Professor Emeritus of Crop Science.
 Brisson, Robert Curtis, Ph.D., Associate Professor Emeritus of Sociology and Anthropology.
 Bristol, David G., D.V.M., Associate Professor of Food Animal and Equine Medicine.
 Britt, Jack Haiden, Ph.D., Professor of Animal Science.
 Bromley, Peter T., Ph.D., Professor of Zoology.
 Brookins, Craig C., Ph.D., Associate Professor of Psychology.
 Brooks, Robert Charles, Ph.D., Professor Emeritus of Economics and Business.
 Brooks, Wayne Maurice, Ph.D., Professor of Entomology.
 Brookstein, David S., Sc.D., Adjunct Professor of Textile and Apparel, Management and Technology.
 Broome, Stephen White, Ph.D., Professor of Soil Science.
 Brothers, Gene LeRoy, Ph.D., Associate Professor of Parks, Recreation and Tourism Management.
 Brown, Alvin Blake, Ph.D., Hugh C. Kiger Professor of Agricultural and Resource Economics.
 Brown, Christopher S., Ph.D., Adjunct Associate Professor of Botany.
 Brown, Dennis T., Ph.D., Professor of Biochemistry.
 Brown, Henry Seawell, Ph.D., Professor Emeritus of Marine, Earth and Atmospheric Sciences.
 Brown, J. David, Ph.D., Assistant Professor of Physics.
 Brown, James W., Ph.D., Assistant Professor of Microbiology.
 Brown, Marvin Luther, Jr., Ph.D., Professor Emeritus of History.
 Brown, Talmage T., Jr., Ph.D., Professor of Microbiology, Pathology, and Parasitology.
 Brown, William E., Ph.D., Adjunct Associate Professor of Poultry Science.
 Brownie, Cavell, Ph.D., Professor of Statistics.
 Brownie, Cecil F., Ph.D., Professor of Anatomy, Physiology, and Radiology.
 Bruck, Robert Ian, Ph.D., Professor of Plant Pathology.
 Bruneau, Arthur Henry, Ph.D., Professor of Crop Science.
 Bryan, Robert Sedgwick, Ph.D., Professor Emeritus of Philosophy and Religion.
 Bryant, Charles Douglas, Ed.D., Associate Professor Emeritus of Occupational Education.
 Bryden, Wayne L., Ph.D., Adjunct Professor of Poultry Science.
 Buchanan, David R., Ph.D., Professor of Textile Engineering, Chemistry, and Science.
 Buckless, Frank Alan Orth, Ph.D., Associate Professor of Accounting.
 Buckner, Sally B., Ph.D., Adjunct Assistant Professor of Curriculum and Instruction.
 Buford, Marilyn A., Ph.D., Associate Professor (USDI) of Forestry.
 Bull, Leonard Seth, Ph.D., Professor of Animal Science.
 Bullerwell, Arthur C., Ph.D., Adjunct Assistant Professor of Textile Engineering, Chemistry, and Science.
 Bullock, Robert Cozart, Ph.D., Professor Emeritus of Mathematics.
 Bumgardner, Carl Lee, Ph.D., Professor of Chemistry.

Bunch, Susan Elizabeth, Ph.D., Professor of Companion Animal and Special Species Medicine.

Bunn, Linda Flowers, Ph.D., Professor of Adult and Community College Education.

Buol, Stanley Walter, Ph.D., Graduate Alumni Distinguished Professor and William Neal Reynolds Professor of Soil Science.

Burke, J. Richard, Ph.D., Adjunct Associate Professor of Electrical and Computer Engineering.

Burkey, Kent Oliver, Ph.D., Associate Professor (USDA) of Crop Science.

Burkholder, JoAnn M., Ph.D., Professor of Botany.

Burleson, Gary R., Ph.D., Adjunct Professor of Microbiology, Pathology, and Parasitology.

Burniston, Ernest Edmund, Ph.D., Professor of Mathematics.

Burns, Joseph Charles, Ph.D., Professor (USDA) of Crop Science.

Burns, Robert Paschal, Jr., M.Arch., Professor of Architecture.

Burrow, James L., Ph.D., Associate Professor of Adult and Community College Education.

Burrus, Barri Braddy, Ph.D., Adjunct Associate Professor of Psychology.

Burt, Millard Paylor, Ph.D., Professor Emeritus of Adult and Community College Education.

Burton, James D., Ph.D., Associate Professor of Horticultural Science.

Burton, Joseph William, Ph.D., Professor (USDA) of Crop Science.

Burton, Ralph Ashby, Ph.D., Professor Emeritus of Mechanical and Aerospace Engineering.

Butcher, Kenneth Roy, Ph.D., Professor of Animal Science.

Butler, Susan M., Ph.D., Assistant Professor of Curriculum and Instruction.

Butterworth, Byron E., Ph.D., Adjunct Associate Professor of Microbiology, Pathology, and Parasitology.

Caddell, Joseph William, Ph.D., Adjunct Assistant Professor of History.

Cahoon, Lawrence B., Ph.D., Interinstitutional Adjunct Graduate Faculty Member in Marine, Earth and Atmospheric Sciences .

Caldwell, Billy E., Ph.D., Professor of Crop Science.

Camp, Leon Raymond, Ph.D., Professor of Communication.

Campbell, Charles Lee, Ph.D., Professor of Plant Pathology.

Campbell, Kenneth Stoddard, B.S., Professor Emeritus of Textile Engineering, Chemistry and Science.

Campbell, Robert George, Ph.D., Adjunct Associate Professor of Forestry.

Campbell, Stephen Lavern, Ph.D., Professor of Mathematics.

Campbell, William Vernon, Ph.D., Professor Emeritus of Entomology.

Canada, John Robert, Ph.D., Professor Emeritus of Industrial Engineering.

Candler, Graham V., Ph.D., Adjunct Associate Professor of Mechanical and Aerospace Engineering.

Cannon, Thomas Franklin, Ph.D., Associate Professor Emeritus of Horticultural Science.

Carawan, Roy Eugene, Ph.D., Professor Emeritus of Food Science.

Carbonell, Ruben G., Ph.D., Graduate Alumni Distinguished Professor and Hoechst-Celanese Professor of Chemical Engineering.

Carlson, Gerald A., Ph.D., Professor of Economics and Business.

Carlton, Charles Hope, Ph.D., Professor of History.

Carmichael, Halbert Hart, Ph.D., Professor of Chemistry.

Carpenter, William Lester, Ed.D., Professor Emeritus of Agricultural and Extension Education.

Carroll, Daniel Edward, Jr., Ph.D., Professor of Food Science.

Carroll, John W., Ph.D., Associate Professor of Philosophy and Religion.

Carson, Martin L., Ph.D., Associate Professor (USDA) of Plant Pathology.

Carter, George L., Jr., Ph.D., Professor Emeritus of Adult and Community College Education.

Carter, Glenda Stephens, Ph.D., Assistant Professor of Mathematics, Science and Technology Education.

Carter, Michael P., Ph.D., Associate Professor of English.

Carter, Philip Brian, Ph.D., Professor of Microbiology, Pathology, and Parasitology.

Carter, Thomas Ames, Ph.D., Professor of Poultry Science.

Carter, Thomas E., Jr., Ph.D., Professor (USDA) of Crop Science.

Carter, William Randolph, Ph.D., Professor of Philosophy and Religion.

Caruolo, Edward Vitangelo, Ph.D., Professor of Animal Science.

Carver, Donna K., D.V.M., Assistant Professor of Poultry Science.

Casas, Ivan A., Ph.D., Adjunct Professor of Microbiology.

Casey, Warren Michael, Ph.D., Adjunct Assistant Professor of Microbiology.

Cashion, Jerry Clyde, Ph.D., Adjunct Assistant Professor of History.

Cassel, Donald Keith, Ph.D., Professor of Soil Science.

Cates, David Marshall, Ph.D., Professor Emeritus of Textile Engineering, Chemistry, and Science.

Catignani, George L., Ph.D., Professor of Food Science.

Cattley, Russell C., V.M.D., Adjunct Associate Professor of Microbiology, Pathology, and Parasitology.

Cavaroc, Victor Viosca, Jr., Ph.D., Professor of Marine, Earth and Atmospheric Sciences.

Caves, Thomas Courtney, Ph.D., Associate Professor of Chemistry.

Cavin, Ralph K., III, Ph.D., Professor of Electrical and Computer Engineering.

Chalmers, Alison E., Ph.D., Adjunct Associate Professor of Toxicology.

Chamblee, Douglas Scales, Ph.D., Professor Emeritus of Crop Science.

Champion, Larry Stephen, Ph.D., Professor Emeritus of English.

Chandler, Richard Edward, Ph.D., Professor of Mathematics.

Chandra, Suresh, Ph.D., .

Chaney, Barbara A., Ph.D., Assistant Professor of Accounting.

Chaney, David Webb, Ph.D., Professor Emeritus of Dean's Office - Textiles.

Chang, Hou-min, Ph.D., Graduate Alumni Distinguished Professor and Reuben B. Robertson Professor of Wood and Paper Science.

Chang, Shou-yuh, Ph.D., Interinstitutional Adjunct Graduate Faculty Member in Civil Engineering .

Chang, Simon W., Ph.D., Adjunct Professor of Marine, Earth and Atmospheric Sciences.

Chao, Allen C., Ph.D., Associate Professor of Civil Engineering.

Chaplin, James Ferris, Ph.D., Professor Emeritus of Crop Science.

Chapman, Stephen N., Ph.D., Associate Professor of Business Management.

Charlton, Harvey Johnson, Ph.D., Assistant Professor of Mathematics.

Checkley, David Milton, Jr., Ph.D., Adjunct Assistant Professor of Marine, Earth and Atmospheric Sciences.

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William T. Brown, *Fayetteville*

Bert Collins, *Durham*

Orville D. Coward Sr., *Sylva*

Ray S. Farris, *Charlotte*

John C. Fennebresque, *Charlotte*

J. Frank Grainger, *Cary*

Lannie G. Horton Sr., *Raleigh*

C. Ralph Kinsey Jr., *Charlotte*

Helen Rhyne Marvin, *Gastonia*

Timothy Keith Moore, *Shelby*

W. Kenneth Morgan Sr., *Jacksonville*

Maxine H. O'Kelley, *Burlington*

Cary C. Owen, *Asheville*

Barbara S. Perry, *Kinston*

D. Wayne Peterson, *Pinehurst*

Earl N. Phillips Jr., *High Point*

Jim W. Phillips Jr., *Greensboro*

Marshall A. Rauch, *Gastonia*

Paul J. Rizzo, *Chapel Hill*

J. Craig Souza, *Raleigh*

Joseph E. Thomas, *New Bern*

Robert F. Warwick, *Wilmington*

James Bradley Wilson, *Durham*

Ex-officio

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James E. Holshouser Jr., *Southern Pines*

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History of the University of North Carolina

In North Carolina, all the public educational institutions that grant baccalaureate degrees are part of the University of North Carolina. North Carolina State University is one of 16 constituent institutions of the multi-campus state university.

The University of North Carolina, chartered by the N.C. General Assembly in 1789, was the first public university in the United States to open its doors and the only one to graduate students in the eighteenth century. The first class was admitted in Chapel Hill in 1795. For the next 136 years, the only campus of the University of North Carolina was at Chapel Hill.

In 1877, the N.C. General Assembly began sponsoring additional institutions of higher education, diverse in origin and purpose. Five were historically black institutions, and another was founded to educate American Indians. Several were created to prepare teachers for the public schools. Others had a technological emphasis. One is a training school for performing artists.

In 1931, the N.C. General Assembly redefined the University of North Carolina to include three state-supported institutions: the campus at Chapel Hill (now the University of North Carolina at Chapel Hill), North Carolina State College (now North Carolina State University at Raleigh), and Woman's College (now the University of North Carolina at Greensboro). The new multi-campus University operated with one board of trustees and one president. By 1969, three additional campuses had joined the University through legislative action: the University of North Carolina at Charlotte, the University of North Carolina at Asheville, and the University of North Carolina at Wilmington.

In 1971, the General Assembly passed legislation bringing into the University of North Carolina the state's ten remaining public senior institutions, each of which had until then been legally separate: Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North Carolina Agricultural and Technical State University, North Carolina Central University, the North Carolina School of the Arts, Pembroke State University, Western Carolina University, and Winston-Salem State University. This action created the current 16-campus University. (In 1985, the North Carolina School of Science and Mathematics, a residential high school for gifted students, was declared an affiliated school of the University).

The UNC Board of Governors is the policy-making body legally charged with "the general determination, control, supervision, management, and governance of all affairs, of the constituent institutions." It elects the president, who administers the University. The 32 voting members of the Board of Governors are elected by the General Assembly for four-year terms. Former board chairmen and board members who are former governors of North Carolina may continue to serve for limited periods as non-voting members *emeriti*. The president of the UNC Association of Student Governments, or that student's designee, is also a non-voting member.

Each of the 16 constituent institutions is headed by a chancellor, who is chosen by the Board of Governors on the president's nomination and is responsible to the president. Each institution has a board of trustees, consisting of eight members elected by the Board of Governors, four appointed by the governor, and the president of the student body, who serves

ex-officio. (The NC School of the Arts has two additional ex-officio members.) Each board of trustees holds extensive powers over academic and other operations of its institution on delegation from the Board of Governors.

Historical Sketch of North Carolina State University

On March 7, 1887, the North Carolina General Assembly passed the act which authorized the establishment of the North Carolina College of Agriculture and Mechanic Arts. The Watauga Club of Raleigh and the statewide farmers' movement had convinced the legislature of the need to transfer the funds received by the state under the provisions of the Morrill Land-Grant Act of 1862 from the University of North Carolina in Chapel Hill to a new land-grant college in Raleigh. The cornerstone of A. and M. College was laid in August, 1888, and its doors were officially opened on October 3, 1889.

Alexander Q. Holladay, the college's first president (1889-1899), and a faculty of five offered courses in agriculture, horticulture, pure and agricultural chemistry, English, bookkeeping, history, mathematics, physics, practical mechanics and military science. The first freshman class numbered about fifty students. By the end of the institution's first decade the resident enrollment had reached 300.

During the administration of **George T. Winston** (1899-1908) a new curriculum in textiles was developed and normal courses were offered in the summer for public school teachers, both men and women. The Agricultural Extension Service was established during the administration of **Daniel H. Hill** (1908-1916) and enrollment grew to more than 700. In 1917, during the administration of **Wallace C. Riddick** (1916-1923), the institution's name was changed to North Carolina State College of Agriculture and Engineering. The introduction of the word engineering was intended to reflect the increasing emphasis on the professional and theoretical as well as the practical aspects of technical education.

In 1923 a major reorganization of the administration of the college was begun, and President Riddick resigned to become the first dean of the new School of Engineering. **Eugene Clyde Brooks** (1923-1934), the fifth president of State College, continued the reorganization with the creation of the School of Agriculture (later renamed the School of Agriculture and Forestry), the School of Science and Business, the School of Education, the School of Textiles and the Graduate School. Resident enrollment rose to nearly 2,000 in 1929 before the Depression caused a drop to approximately 1,500 in 1933. The first women graduates of State College received their degrees in 1927.

In the midst of the Depression, the General Assembly of 1931 attempted to promote economy and to prevent unnecessary duplication among the three leading state institutions of higher education by establishing a single consolidated administration for the University of North Carolina in Chapel Hill, North Carolina State College of Agriculture and Engineering, and North Carolina College for Women in Greensboro. Dr. Frank Porter Graham, president of the University of North Carolina, was elected president of the consolidated university, and Dr. Brooks, with the title of vice president, continued as chief administrative officer at State College. Among the consequences of consolidation were the phasing out of the School of Engineering at Chapel Hill and the School of Science and Business at Raleigh. A general college, later called the Basic Division, was established to provide two years of basic courses

in humanities, social sciences and natural sciences as a foundation for students in the various degree-granting technical and professional schools.

Colonel **John W. Harrelson** (1934-1953), Class of 1909, was the first alumnus to become administrative head of State College. Under the consolidated organization his title was Dean of Administration; later it was changed to Chancellor. During Harrelson's administration the institution experienced the beginning of extraordinary growth in the aftermath of World War II. Two new schools were established: the School of Design and the School of Forestry. A multi-million dollar expansion program was completed during the administration of **Carey H. Bostian** (1953-1959), and the program of student activities was greatly enlarged, as the enrollment passed 5,000.

The faculty and student population more than doubled during the administration of **John T. Caldwell** (1959-1975) and another new school was organized: the School of Physical Sciences and Applied Mathematics (now Physical and Mathematical Sciences). The School of General Studies, the successor to the Basic Division, was renamed the School of Liberal Arts and was authorized to offer a full range of bachelor's and master's degree programs in the humanities and social sciences. The name of the institution itself was changed in 1965 to North Carolina State University, signifying its new role as a comprehensive university.

NCSU's enrollment passed 20,000 during the administration of Chancellor **Joab L. Thomas** (1976-1981). The School of Veterinary Medicine was established, the name of the School of Liberal Arts was changed to School of Humanities and Social Sciences, and North Carolina State University was recognized as one of two major research universities within the statewide University of North Carolina.

Bruce R. Poulton (1982-1990) became chancellor in the fall of 1982. A major expansion of the University's research budget, the establishment of a substantial endowment to provide enlarged resources for research equipment and endowed professorships, and the addition of the 1,000-acre Centennial Campus occurred during this administration. All of the schools were renamed colleges except for the School of Design and The Graduate School. In addition, the School of Education became the College of Education and Psychology.

In 1990 **Larry K. Monteith**, an alumnus and former Dean of the College of Engineering, became chancellor and NCSU's eleventh chief administrative officer. Among his early initiatives were the creation of the Division of Undergraduate Studies and the First Year Experience Program. The College of Textiles and ABB (Asea Brown Boveri), NCSU's first corporate partner, moved to Centennial Campus in 1991. In 1992, the College of Management was established.

BOARD OF TRUSTEES

North Carolina State University

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Smedes York, *Raleigh, Vice Chairman*
Edward E. Hood, *Banner Elk, Secretary*
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Robert N. Spilman, *Bassett, VA*
H. E. Wilson Jr., *Burlington*

Ex-officio

Jenny C. Chang, *President, Student Government, NCSU*

Mission of North Carolina State University

The unique mission of North Carolina State University is to serve the citizens of North Carolina as the State's only research university in the land-grant tradition. Since its founding in 1887, NCSU has been committed to science and technology as pathways to human betterment and has served as an innovative educational resource, providing leadership for positive intellectual, social, and technological change. Faithful to its founding mission, the University must now meet the challenges posed by the increasing complexity of our global society and the accelerated growth in knowledge and technology. At the same time, it must continually address the effects of these developments on the environment and on the social and economic well-being of the people of North Carolina, the nation, and the world. Spurred by these new challenges, NCSU will continue to fulfill its mission through the integrated functions of teaching, research, and extension, its unique form of public service.

Teaching, research, and public service will continue to be mutually enriching enterprises at NCSU. The activities of research and extension interact to provide students with an environment for learning that stresses creativity, problem solving, social responsibility, and respect for human diversity. The educational and extension functions join to apply, test, and disseminate the new knowledge generated by research.

During the University's first hundred years, its distinctive mandate has led to preeminence in science, technology, and engineering. This mandate will continue to shape future development, necessitating excellence in the full spectrum of disciplines that provide the intellectual and critical foundations for understanding, anticipating, and responding to public needs.

Undergraduate education is a major responsibility of North Carolina State University. Core education is provided in science and the humanities, with specializations offered in physical, social, and life sciences, in the humanities, and in professional and technical disciplines. The

atmosphere of a research university provides distinctive opportunities for undergraduates to benefit from the experience of research in the classroom, laboratory, and informal settings. Exposure to the discovery and synthesis of new information provides students with a basis for identifying and solving society's problems and builds a critical foundation for their personal growth, cultural enrichment, and professional development.

As a national center for doctoral studies, NCSU embraces the responsibility to maintain excellence in graduate research and education. Students work as partners with faculty in the creation, expansion, conservation, and transmission of knowledge. Graduate education will continue to evolve as the University builds on its traditional and preeminent strengths in science, technology, and engineering and as it develops further strengths in complementary disciplines.

Research and scholarly inquiry form the foundation for education and public service at NCSU. Faculty and students in all disciplines engage in the art and science of discovery in a climate of free inquiry and creativity, extending the boundaries of knowledge and horizons of human intellect. The research mandate of NCSU is signified in its national classification as a Research University I.

The University's land-grant philosophy is manifest in its commitment to active stewardship of the human and natural resources of the State. NCSU has been an integral part of significant economic and technological changes in North Carolina for the past one hundred years. This stewardship is expressed currently through public service activities in all the University's colleges and schools, whereby the expertise resident among the faculty and students is disseminated across the State through extension, technical assistance, professional development, lifelong education, and technology transfer programs. Loyal to the vision of its founders in the nineteenth century, NCSU will continue to strive through extension and public service to improve the quality of life for North Carolinians into the twenty-first century.

NCSU's dual designations as land-grant university and a Research University I form the basis for the unique role of NCSU in The University of North Carolina. North Carolina State University stands on the threshold of a new century with deep appreciation for the significance of these mandates and the commitment to excellence and change that they jointly require.

Accreditation by the Southern Association of Colleges and Schools

NCSU is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the associate, baccalaureate, master's and doctoral degrees.

Policy on Illegal Drugs

The policy on illegal drugs was adopted by the North Carolina State University Board of Trustees on April 16, 1988 and can be found in the Student Code of Conduct and other publications including the Official Bulletin, the Student Handbook, the Faculty Handbook, the Advisers' Handbook and the Human Resources newsletter.

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F

٤

E

- N S E W.—indicates side of building with accessible entrance

passenger elevator

■ freight elevator

■ freight elevator
T accessible toilet

1 accessible toilet

D

C

B

A

ACCESS

NC

BUILDING NAME

- 1 Alexander Residence
- 2 Alumni Memorial
- 3 Bagwell Residence
- 4 Becton Residence
- 5 Berry Residence
- 6 Biltmore Hall
- 7 Bowen Residence
- 8 Bragaw Residence
- 9 Brooks Hall
- 10 Kampfoelner Hall
- 11 Broughton Hall
- 12 Burlington Engine
- 13 Bureau of Mines
- 14 Carmichael Gym
- 15 Carrill Residence
- 16 Case Athletics C
- 17 Central Stores
- 18 Chancellor's Res



Accreditation by the Southern Association of Colleges and Schools

NCSU is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the associate, baccalaureate, master's and doctoral degrees.

North Carolina State University Bulletin
The Graduate School
Box 7102
Raleigh, North Carolina 27695-7102

1998 Spring Commencement

North Carolina State University

Saturday, May 16
Nineteen Hundred and Ninety-Eight
Degrees Awarded 1998



DEGREES TO BE CONFERRED

Saturday, May 16
Nineteen Hundred and Ninety-Eight

This program is prepared for informational purposes only. The appearance of an individual's name does not constitute the University's acknowledgement, certification, or representation that the individual has fulfilled the requirements for a degree.

Honors listed for May 1998 candidates for degree are tentative in that they are calculated without the final semester grades.

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CHANCELLOR LARRY K. MONTEITH



Chancellor Larry K. Monteith has been affiliated with NC State University for 41 years -- as a student, alumnus, faculty member, dean and chancellor. Monteith announced in September that he will retire at the end of July. When he was named interim chancellor in 1989, he pledged to enhance NC State's academic reputation as a premier research institution and to lead the university into its second century of service to the state.

During his tenure, NC State earned a chapter of the elite Phi Beta Kappa honor society. Six-year graduation rates for students increased to 67 percent. The university strengthened its financial base, completing a \$230 million fund-raising campaign and launching an \$80 million campaign to enhance endowment support for student scholarships and fellowships.

Growth exploded on the university's Centennial Campus under Monteith, with eight new buildings valued at \$127 million, including the \$45.5 million Engineering Graduate Research Center, which opened last fall. Five more buildings, valued at about \$55 million, are under construction or in the planning stages.

Other milestones during Monteith's tenure include the establishment of the College of Management and the development of First Year College, which is geared to ensuring the success of new students. The university's athletics program was among the first in the region to receive official certification by the NCAA, and the NCSU Libraries jumped more than halfway to the top among the 108 national research libraries. Funding for research increased 74 percent during Monteith's eight years as chancellor, rising from \$160 million in 1989 to nearly \$334 million last year. Patents awarded to NC State researchers increased nearly fivefold, making the university's researchers the 13th most active inventors in the country.

A native of Bryson City, Monteith earned his bachelor of science degree in electrical engineering at NC State in 1960. He went to graduate school at Duke University, where he earned a master's degree in 1962 and his doctorate in 1965, both in electrical engineering. He was honored with the Distinguished Engineering alumnus Award by Duke in 1984.

While working toward his graduate degrees, Monteith joined the technical staff of Bell Telephone Labs, where he was employed from 1960 to 1962. He then worked as a member of the technical staff at Research Triangle Institute (RTI) from 1962 to 1968. During his tenure at RTI, he joined the NC State University faculty as an adjunct assistant professor of electrical engineering in 1965. Three years later, he joined the faculty full time as an associate professor.

In 1972, he was named full professor, and two years later was named head of the department, a position he held for four years before becoming dean of the College of Engineering in 1978. While serving on the faculty, Monteith developed an outstanding academic reputation through his teaching, research and publications. In addition to providing leadership to a number of interdisciplinary and interinstitutional programs, Monteith serves, or has served, on many statewide committees and projects.

Monteith and his wife, Nancy, have a daughter and two sons.

MUSICAL PROGRAM

EXERCISES OF GRADUATION

May 16, 1998

Commencement Band Concert 8:30 a.m.
Carter-Finley Stadium

On the Mall March John Philip Sousa

First Suite in Eb Gustav Holst

I. Chaconne

II. Intermezzo

III. March

Allerseelen Richard Strauss

The Nutmeggers March Eric Osterling

Fantasy on American Sailing Songs Clare Grundman

His Honor March Henry Fillmore

Processional: 9:00 a.m.

March Processional Clare Grundman

Flourish for Wind Band Ralph Vaughan Williams

Recessional:

His Honor March Henry Fillmore

NORTH CAROLINA STATE UNIVERSITY COMMENCEMENT BAND

Dr. John A. Fuller, *Conductor*

EXERCISES OF GRADUATION

Carter-Finley Stadium
Chancellor Larry K. Monteith
Presiding
May 16, 1998

PROCESSIONAL, 9:00 a.m. Dr. John A. Fuller

Conductor, North Carolina State University Commencement Band.
The audience is requested to remain seated during the Processional.

WELCOME Chancellor Larry K. Monteith

INVOCATION The Reverend John J. Wilkins
Wake Chapel Missionary Baptist Church

NATIONAL ANTHEM The Grains of Time

INTRODUCTIONS Chancellor Monteith

ADDRESS General Henry Hugh Shelton
Chairman of the Joint Chiefs of Staff

CONFERRING OF DEGREES Chancellor Monteith

Candidates for Doctor of Veterinary Medicine presented by Dean of College of
Veterinary Medicine. Candidates for other advanced degrees presented by Dean
of Graduate School. Candidates for baccalaureate degrees presented by Deans of
Colleges.

ADDRESS TO FELLOW GRADUATES Ms. Patricia Festin
Class of 1998

RECOGNITIONS Chancellor Monteith

VALEDICTORIANS CLASS OF 1998

Jamie Carol Byrum
Kyler Austin England
David Wayne Grantham
Parul Arvind Jariwala
Anthony Mark Jones
Dharti Arvind Patel

Jennifer Jo Peterson
Mason Jacob Reed
Michael Donald Rhodes
David Brandon Smith
Robert Marion Soule III
John David Storey

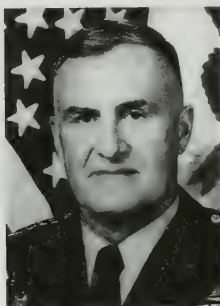
TURNING OF THE TASSEL Mr. Joshua Hawn
President, Senior Class

ALMA MATER The Grains of Time

RECESSIONAL (Platform Party only)

The audience is requested to be seated during the Recessional.

GENERAL HENRY HUGH SHELTON



General Henry Hugh Shelton, chairman of the Joint Chiefs of Staff and a highly decorated graduate of North Carolina State University, is the first member of the elite U.S. Army Special Forces -- the Green Berets -- to rise to the nation's top military post. The 56-year-old, four-star general became the 14th chairman of the Joint Chiefs of Staff in October 1997.

The Edgecombe County native serves as the principal military adviser to the president, the secretary of defense and the National Security Council. Previously, he served as commander in chief of the U.S. Special Operations Command, which oversees the Green Berets and the Navy SEALs.

Shelton earned his commission through the Reserve Officers Training Corps at NC State, where he graduated in 1963 with a degree in textile technology. He earned a master of science degree from Auburn University. His military education includes completion of the Air Command and Staff College and the National War College programs. In the two decades after his commissioning, Shelton held a variety command and staff positions in the United States and Vietnam. He served two tours in Vietnam, first with the 5th Special Forces Group and then with the 173rd Airborne Brigade.

Following his selection in 1987 as brigadier general, Shelton served in the Operations Directorate of the Joint Staff. In 1989, he began a two-year assignment as assistant division commander for operations of the 101st Airborne Division (Air Assault) -- a tour that included a seven-month deployment to Saudi Arabia for Operations Desert Shield and Desert Storm. After the Gulf War, he was promoted to major general and assigned to Fort Bragg, where he commanded the 82nd Airborne Division. He was promoted to lieutenant general in 1993. In 1994, he commanded the Operation Uphold Democracy joint task force in Haiti. In 1996, Shelton was promoted to general and became commander in chief of the U.S. Special Operations Command.

His awards and decorations include the Defense Distinguished Service Medal (with 2 oak leaf clusters), Distinguished Service Medal, Legion of Merit (with oak leaf cluster), Bronze Star Medal with V device (with 3 oak leaf clusters), and the Purple Heart.

Shelton is married to Tarboro native Carolyn Johnson Shelton. They have three sons, Jon, Jeff and Mark.



Edgar S. Woolard Jr., retired chairman and chief executive officer of E.I. duPont de Nemours & Co., is an alumnus and advocate of North Carolina State University. A 1956 graduate of the NC State College of Engineering, the Washington, N.C., native joined DuPont in 1957 as an industrial engineer at its Kinston site.

He rose through the company ranks and in 1989 became one of the youngest men to hold the job of chairman in the company's history. Called by *U.S. News & World Report* "The New Organization Man," Woolard is credited with leading by example, initiating total quality management principles, embracing technological change in the industry, and guiding DuPont to a leadership position in the global marketplace.

Woolard also was one of the first leaders in the chemical industry to espouse "corporate environmentalism," a commitment to place corporate environmental stewardship in line with societal needs and expectations around the world. It was a leadership commitment that required extra effort and investments to modify or adopt new practices and processes.

For many years, Woolard's bold leadership also has raised expectations and possibilities for NC State. He is a member of the N.C. Textiles Foundation and a member of the Lifetime Giving Societies' Peele and Pullen societies, and is a former member of the NC State Board of Trustees.

Less than a decade ago he served as honorary chairman of NC State's successful Century II Campaign, a five-year, \$230 million effort for the support of university programs in teaching, research and public service.

Last year, Woolard signed on as a member of the Campaign for NC State Students leadership team, which is seeking to raise \$80 million in endowments for scholarships and fellowships by December 1999. He and his wife, Peggy, contributed more than \$1 million to endow John T. Caldwell Alumni Scholarships. The campaign is expected to exceed its goal, having already reached the 90 percent mark.

Woolard was the recipient of the Distinguished Engineering Alumnus Award at NC State in 1988 and recently received the Alumni Association's 1998 Meritorious Service Award.

He and his wife, Peggy, reside in Wilmington, DE and Jupiter, FL.

TIME AND LOCATION FOR DISTRIBUTION OF DIPLOMAS

College of Agriculture and Life Sciences - 1:30 p.m.

Agricultural Business Management and Agricultural Economics	225 Nelson Hall
Agricultural and Extension Education	Mt. Olivet Baptist Church, 3500 Edwards Mill Road
Agronomy, Crop Science, and Soil Science	2215 Williams Hall
Animal Science	Room 2, McKimmon Center, Western Boulevard
Biochemistry	Room 6, McKimmon Center, Western Boulevard
Biological and Agricultural Engineering	Machinery Pavilion, D. S. Weaver Laboratories
Biological Sciences	3712 Bostian Hall
Botany, Ecology, Entomology, Genetics, Microbiology, Plant Pathology and Toxicology	2722 Bostian Hall
Environmental Sciences	Location of Major Faculty Advisor
Food Science and Nutrition	Front Lawn, Schaub Hall (In case of rain, 105 Schaub Hall)
Horticultural Science	NCSU Arboretum, Beryl Road (In case of rain, 159 Kilgore Hall)
Natural Resources	Location of Major Faculty Advisor
Physiology Program	Location of Major Faculty Advisor
Poultry Science	106 Scott Hall
Applied Sociology	218 Withers Hall
Zoology, Fisheries and Wildlife Sciences, Medical Technology	Forest Hills Baptist Church, 3110 Clark Avenue

School of Design - 1:30 p.m.	Stewart Theatre, Talley Student Center
Reception - 2:30 p.m.	Brooks Hall Courtyard

College of Education and Psychology - 1:30 p.m. except for those marked with an asterisk

Adult and Community College Education, Administration and Supervision, Education General Studies and Health Occupations Education (Graduate Students)	McKimmon Center, Western Boulevard
Reception immediately following departmental ceremony	McKimmon Center, Western Boulevard
Counselor Education	216 Poe Hall
*Curriculum and Instruction, Special Education, Health Occupations Education (Undergraduate Students), Marketing Education and Middle Grades Education - 2:00 p.m.	South Wing, Fountain Dining Hall
Mathematics, Science, Occupational and Technology Education.	Martin Middle School Auditorium, 1701 Ridge Road
*Psychology - 1:00 p.m.	South Wing, Fountain Dining Hall

College of Engineering - 1:30 p.m. except for those marked with an asterisk

Aerospace Engineering	Ballroom, Talley Student Center
Biological and Agricultural Engineering	Machinery Pavilion, D. S. Weaver Laboratories
Chemical Engineering	Harris Field (In case of rain, Cinema, Witherspoon Student Center)
Civil Engineering	240 Nelson Hall
Computer Science	Athens Drive High School Auditorium, 1420 Athens Drive
Electrical and Computer Engineering	Edenton Street United Methodist Church, 228 West Edenton Street
Industrial Engineering	Brooks Avenue Church of Christ, 700 Brooks Avenue
Integrated Manufacturing Systems	246 Engineering Graduate Research Center, Centennial Campus
Master of Engineering	246 Engineering Graduate Research Center, Centennial Campus
Materials Science and Engineering	McKimmon Center, Western Boulevard
* Mechanical Engineering (Undergraduate) 2:30 p.m.	Ballroom, Talley Student Center
Mechanical Engineering (Graduate)	Ballroom, Talley Student Center
Nuclear Engineering	North Portico, Burlington Engineering Laboratories

College of Forest Resources - 1:30 p.m.

Forestry	McKimmon Center
Parks, Recreation and Tourism	McKimmon Center
Wood and Paper Science	McKimmon Center

College of Humanities and Social Sciences - 1:30 pm except for those marked with an asterisk

Communication	The Raleigh Convention & Conference Center Complex
English	Court of the Carolinas (In case of rain, Carmichael Gym)
Foreign Languages and Literatures	Holy Trinity Lutheran Church Fellowship Hall, 2723 Clark Avenue
History	Brickyard at Harrelson Hall (In case of rain, 107 Harrelson Hall)
*Multidisciplinary Studies - 3:00 p.m.	Room 126, Witherspoon Student Center
Philosophy and Religion	Holy Trinity Lutheran Church Fellowship Hall, 2723 Clark Avenue
Political Science and Public Administration	Highland United Methodist Church, 1901 Ridge Road
Social Work	Education Building, 301 N. Wilmington Street
Sociology and Anthropology	218 Withers Hall

College of Management - 1:30 p.m.

Accounting	Main Floor, Reynolds Coliseum
Business Management	Main Floor, Reynolds Coliseum
Economics	Main Floor, Reynolds Coliseum

College of Physical and Mathematical Sciences - 1:30 p.m.

Chemistry	222 Dabney Hall
Mathematics	124 Dabney Hall
Physics	206 Cox Hall
Statistics	Ephesus Baptist Church, 6767 Hillsborough Street
Marine, Earth and Atmospheric Sciences	242 Riddick Hall

College of Textiles - 1:30 p.m.

Courtyard, Centennial Textile Complex

ROTC COMMISSIONING CEREMONY

CAPTAIN DOUGLAS B. GUTHE, JR.
Presiding

Stewart Theatre
Talley Student Center
May 16, 1998

PROCESSIONAL MARCH, 4:00 p.m	Dr. John A. Fuller <i>Conductor, North Carolina State University Commencement Band</i>
POSTING OF THE COLORS	Navy ROTC Color Guard
NATIONAL ANTHEM	
INVOCATION	Commander Larry D. Cripps
WELCOME	Dr. Larry K. Monteith <i>Chancellor</i>
INTRODUCTIONS	Captain Douglas B. Guthe, Jr. <i>Professor of Naval Science</i>
ADDRESS	General Henry H. Shelton <i>Chairman of the Joint Chiefs of Staff</i>
ADMINISTRATION OF THE OATH OF OFFICE	Colonel Robert L. Ostrander <i>Professor of Aerospace Studies</i> Captain Douglas B. Guthe, Jr. <i>Professor of Naval Science</i> Lieutenant Colonel David J. Cannon <i>Professor of Military Science</i>
PRESENTATION OF CERTIFICATES	Dr. Larry K. Monteith General Henry H. Shelton
BENEDICTION	Commander Larry D. Cripps
RETIRING OF THE COLORS	Navy ROTC Color Guard
RECESSIONAL	North Carolina State University Commencement Band The audience is requested to remain seated until the Recessional music is completed.

COMMENCEMENT USHERS

Air Force ROTC Ushers

Johnathan Albaugh
Matthew Arrington
Wallis Collie
Elizabeth Van Patten
Andre Walton

Navy ROTC Ushers

Andrew Bucher
Bradley Brooks
Kevin Crow
Craig Karsch
Peggy Mills
Sean Prevo
Ryan Rogers
Jason Schafer
John Scorzello
Ryan Smith

Army ROTC Ushers

Jonathon Ackiss
Natalie Card
Edward Gomez
Rose Gomez
Kerry Graves
Kevin Kelley
Mary Miller
Justin Overbaugh
Eugene Seiter
Jennifer Tudor

COMMENCEMENT MARSHALS

Nicole M. Ambrozevitch
Kristen A. Balkcum
Akhil Bhaskar
JoAnn May Bricker
Erika Cohen
Jaime N. Driver
Kathryn Jeanne Ellis
Alexia K. Fody
Derek M. Foster
David C. Franklin
L. Christine Gilbert
Stephanie E. Gillis
Joey Kareem Grinkley
Jason Andrew Grissom
Amy Hawn
David Royden Higgins
Nick Higgins
Andrew T. Hnat
Jason Griffith Ho
Brandi Dion Holcomb
Britt Ethan Houser
Eva Ann Jablonski
Kristel Leigh Jernigan
LaTonya M. Johnson
Nathan S. Johnson

Douglas Robert Jones
Michael Joyner
Jackie A. Kearney
Dennis J. Kim
Benjamin D. Lee
Maeva A. Louis
Abee C. Lowman
Carrie R. Lubus
Melanie J. Lucero
Sybil L. MacDonald
Lara Massey
Kelly Arleen McAvoy
Marcus B. McCoy
Laura L. McCrain
Jen J. McLean
Jeri L. Meeker
Elizabeth P. Mitchell
William John Mitchell
Ashley E. Moran
Zachary H. Myers
Alison Renee Oakley
Eun Chu Julie Oh
Jennifer LeAnn Overcash
Melanie C. Pearce

Luke W. Perry
Dawn Phillips
Holly Pollock
Atif Yasin Raja
Steve J. Robinson
Terrell Griffin Russell
Matthew C. Senter
Jennifer L. Shafer
Niel P. Slaughter
Hayden A. Stack
David Glenn Tester
Jennifer L. Ulichny
Summer Rose Van Wagnen
Henry Clark Ward
Shannon Ward
Ross Ritchie Weikel
Laura Jane Weston
Seth Warren Whitaker
Thomas Paul Winkler
Daniel Paul Wise
Dawn Wotapka
Luke S. Zettlemoyer

FACULTY RETIREMENTS, 1997-98

- Adams, Dewey A., College of Education and Psychology, retired December 31, 1997.
- Arnold, John R., College of Education and Psychology, retired December 31, 1997.
- Bateman, Durward F., College of Agriculture and Life Sciences, retired September 30, 1997.
- Buckmaster, H. Leo, Finance and Information Systems Division, retired July 31, 1997.
- Bradbury, Phyllis C., College of Agriculture and Life Sciences, retired December 31, 1997.
- Bunn, Linda F., College of Agriculture and Life Sciences, retired, September 30, 1997.
- Caruolo, Edward V., College of Agriculture and Life Sciences, will retire September 30, 1998.
- Cobb, Grover C., College of Physical and Mathematical Sciences, retired July 1, 1997.
- Collins, Carroll E., College of Agriculture and Life Sciences, retired October 31, 1997.
- Combs, Russell C., Division of Student Affairs, retired July 1, 1997.
- Davis, A. Clarke, College of Agriculture and Life Sciences, retired July 1, 1997.
- Davis, Anne L., College of Engineering, retired July 1, 1997.
- Fuller, Jr., Earl H., College of Engineering, retired August 31, 1997.
- Garwig, Paul L., NCSU Libraries, retired February 28, 1998.
- Gay, Robert W., College of Agriculture and Life Sciences, retired July 1, 1997.
- Gilbert, John H., College of Humanities and Social Sciences, retired December 31, 1997.
- Gurley, Edward D., College of Engineering, retired December 31, 1997.
- Hamm, Jr., Thomas E., College of Veterinary Medicine, retired December 31, 1997.
- Harris, Jr., Edwin F., University Architect, Facilities Division, retired January 31, 1998.
- Jones, Evan E., College of Agriculture and Life Sciences, retired December 31, 1997.
- Katzin, Gerald H., College of Physical and Mathematical Sciences, retired December 31, 1997.
- Lucas, Leon T., College of Agriculture and Life Sciences, retired January 31, 1998.
- Matthews, Neely F. J., College of Engineering, will retire June 30, 1998.
- McClain, Jack M., College of Humanities and Social Sciences, retired July 1, 1997.
- Mulholland, James A., College of Humanities and Social Sciences, will retire June 30, 1998.
- Pasour, Ernest C., College of Agriculture and Life Sciences, retired December 31, 1997.
- Perry, Jerome J., College of Agriculture and Life Sciences, retired December 31, 1997.
- Phillips, Richard E., College of Agriculture and Life Sciences, retired September 30, 1997.
- Rice, Barbara S., Division of Student Affairs, will retire May 31, 1998.
- Robbins, Woodrow E., College of Engineering, retired December 31, 1997.
- Roberts, John C., College of Agriculture and Life Sciences, retired August 31, 1997.
- Savage, Robert G., College of Physical and Mathematical Sciences, retired July 31, 1997.
- Smith, J. C., College of Engineering, will retire June 30, 1998.
- Smith, Jr., William A., College of Engineering, retired December 31, 1997.
- Snow, Nancy H., College of Humanities and Social Sciences, retired December 31, 1997.
- Stanislaw, Charles M., College of Agriculture and Life Sciences, retired July 31, 1997.
- Stuber, Charles W., College of Agriculture and Life Sciences, retired January 3, 1998.
- Tilley, D. Ronald, College of Physical and Mathematical Sciences, will retire June 30, 1998.
- Tomasino, Charles, College of Textiles, retired September 1, 1997.
- VanderLugt, Marilyn J., Division of Student Affairs, retired December 31, 1997.
- Van Eck, Ngaire, College of Agriculture and Life Sciences, retired July 1, 1997.
- Wilk, John C., College of Agriculture and Life Sciences, retired December 31, 1997.
- Zorowski, Carl F., College of Engineering, retired December 31, 1997.

ACADEMIC COSTUME

Academic gowns represent a tradition handed down from the universities of the Middle Ages. These institutions were founded by the Church; the students, being clerics, were obliged to wear the prescribed gowns at all times. Round caps later became square mortarboards; the hoods, originally cowls attached to the gowns, could be slipped over the head for warmth.

Many European universities have distinctive caps and gowns which are different from those commonly used in this country. Some of the gowns are of bright colors and some are embellished with fur. A number of these may be noted in the procession.

The usual color for academic gowns in the United States is black. The bachelor's gown is worn closed, the master's and doctor's may be worn open or closed. The shape of the sleeve is the distinguishing mark of the gown: bachelor--long pointed sleeves; master--oblong, square cut in the back with an arc cut away in front; doctor--bell shaped.

Caps are black. The tassels for the Ph.D. degree are gold and those for other graduate and professional degrees may be of the color corresponding to the trimmings on the hoods.

Of all the components of the academic costume, the hood bears the heaviest symbolic burden. The hood must make clear the level of the degree, the faculty in which it was given, and the institution which awarded it. The level of the degree is shown by the size of the hood, the width of the velvet trimming, and in the case of doctors, by the shape. The bachelor's, master's, and doctor's hoods are three feet, three and one-half feet, and four feet long, respectively. The velvet trimming in the same order is two, three, and five inches and extends all around the hood on the exposed edge. This same trimming identifies the faculty in which the degree was awarded. For each faculty there is a corresponding color, so a glance at the trimming is all that is needed to identify the faculty. A partial list of the colors follows: Agriculture, maize; Architecture and Art, brown; Science, golden yellow; Economics, copper; Education, light blue; Engineering, orange; Forestry, russet; Physical Education, sage green; Religion, scarlet; Speech, silver gray; Veterinary Medicine, gray; Textiles, wine red. The following faculties have the same color--dark blue: Anthropology, History, Languages, Literature, Philosophy, Political Science, Sociology.

ACADEMIC HONORS

Honors participants benefit from a more individualized and rigorous approach to their desired degree through special classes, seminars and individual research.

Undergraduate degree honor designations are:

Cum Laude--for GPA 3.250 through 3.499 (white sash)

Magna Cum Laude--for GPA 3.500 through 3.749 (red sash)

Summa Cum Laude--for GPA 3.750 and above (gold sash)

THE ALMA MATER

Words by:

ALVIN M. FOUNTAIN, '23

Music by:

BONNIE F. NORRIS, JR., '23

Where the winds of Dixie softly blow
o'er the fields of Caroline,

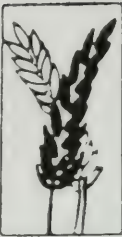
There stands ever cherished N.C. State,
as thy honored shrine.

So lift your voices; Loudly sing
from hill to oceanside!

Our hearts ever hold you, N.C. State
in the folds of our love and pride.

UNDERGRADUATE DEGREES

Degrees To Be Conferred on May 16, 1998



College of Agriculture and Life Sciences

BACHELOR OF SCIENCE IN BIOLOGICAL AND AGRICULTURAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

Douglas Allen Cassle	Sylva
Jay Nathan Guffey	Rutherfordton
Moses Dow Lasitter III	New Bern
Lorie Ann Locklear	Shannon
John William McCullen II	Mount Olive
Joseph Wayne McKemey	Jacksonville

BACHELOR OF SCIENCE IN BIOLOGICAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

* Jennifer Dawn Bunch	Eden
Julie Lynn Crutchfield	Whiteville
Jonathan Courtney Evans	Durham
Amanda Marie Fody	Charlotte
William Corbett Gupton	Tarboro
* Jason Daniel Latta	Durham
Christopher Neil Marshall	Clemmons
** Stonewall Davis Mathis	Mount Olive
Brandi Michelle Miniard	Lumberton
Kathleen Rebecca Mode	Morganton
S** Robert Chad Myers	Elkin
Michael Paul Sherman	Salisbury
Trevor Charles Thomason	Pfafftown

BACHELOR OF SCIENCE IN AGRICULTURAL BUSINESS MANAGEMENT

Bobby Joe Allen	Asheboro
Michael Bradley Bass	Clinton
Eric Jonathan Baucom	Charlotte
Ron Everette Carter	Clinton
Tammara Leigh Cole	Arden

Holly Brooke Cornelius	Mooreville
Tammy Dean Dixon	Graham
Jason Brent Earnhardt	North Myrtle Beach, SC
James Thomas Gainey	Goldsboro
Jennifer Lindsay Hanf	Cary
Brian Shepard Honeycutt	McGee's Crossroads
James Michael Lambeth	Ellerbe
Michael Troy Le Doyen III	Raleigh
Emily Lyn Maxwell	Pemberton, NJ
Mary Ellen Murphy	Benson
Johnathan Otis Patterson	Carthage
Nelson Parker Powell	Clinton
Emily Lynn Redmon	Lake Lure
+** Petra Rijdes	Hillsborough
Brandon Lee Warren	Newton Grove
John Barlow White	Charlotte

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION

Shawn Page Carawan	Lowland
Christopher Lee Carter	Scotland Neck
* Angel Dawn Cartwright	Hertford
* Stephen Jones Cashwell	Autryville
H** Misty Nicole Church	Lawndale
Andy Ray Cole	Coats
Rhett Edward Greene, Jr.	Lexington
* Michael Shane Honeycutt	Willow Springs
*** Jeremy Bruce Johnson	Columbus
* Michael Alton Johnson	South Mills
** Charles Frederick Mitchell	Youngsville
Cameron Wayne Sawyer	Barco
Megan Marie Southerland	Mount Olive
Kemp Leon Teague	Goldsboro
Robert Jerome Walker	Oxford
Robert Jason Walls	Goldsboro
Rebecca Louise Young	Asheville

BACHELOR OF SCIENCE IN AGRICULTURAL AND ENVIRONMENTAL TECHNOLOGY

Jason Clifford Elliott	Denton
Mark Rosser Laugisch	Raleigh
James Hezekiah Millard	Mount Olive
Matthew James Moyer	Monroe
Ronald Chase Tew	Dunn

BACHELOR OF SCIENCE IN AGRONOMY

Stanley Jason Barnes	Pendleton
+*** Don McKesson Davis	Morganton
Walter Brian Eason	Rocky Mount
Charles Stephen Jones	Smithfield
Kyung-Joon Koh	Seoul, South Korea
Jonathan Thurman Linker	Mooreville

S***	Amy Michelle Mabery	Newton
	Larry Brent Mann	Pendleton
	Jeremy Roger Martin	Eagle Springs
	James Wingate McNeill III	Raleigh
	Samuel Lee Parker	Wendell
	Phillip Ryan Patterson	Broadway
	James Powell Plummer III	Raeform
**	George Hunter Scott	Milton
	Cale Edward Tart	Newton Grove
	Michael Joseph Wyatt	Concord

BACHELOR OF SCIENCE IN ANIMAL SCIENCE

	Kelly Dawn Alford	Mooresville
	Sid Ray Ballantyne	Nyssa, OR
+**	Katherine Elisabeth Barger	Davidson
***	Cortney Camille Barkley	Belmont
+	Lisa Nicole Baucom	Mint Hill
	Robert Steven Betka	Greensboro
**	Zachary Kinnaird Bissell	Virginia Beach
	James Travis Brady	McLeansville
H**	Susan Laura Buchanan	Fayetteville
***	Karen Elizabeth Burlone	Asheville
	Heather Laraine Carr	Goshen, NJ
H*	Brian Norris Chorley	Jacksonville
	Larry Shannon Christian	Gastonia
*	Katie Heather Clark	Greenville
	Carly Elizabeth Collins	China Grove
+	Mitchell Lance Davis	Tryon
*	Jayne Marie Dewey	Binghamton, NY
	David William Draper	North Caldwell, NJ
	Jaime Edward Fisher	Troy
***	Heidi Harper Friedlein	Durham
	Jennifer Leigh Godwin	Rocky Mount
	Rachel Marie Gunshinan	Raleigh
	Miles Kory Hair	Elizabethtown
+***	Samuel Jason Hartsell	Carthage
*	Meredith Rene Haynes	Elkin
	William Brandon Higgins	Rutherfordton
*	Helen Virginia Hollingsworth	Wilmington
	Antoinette Izzo	Tar Heel
	Anne Sterling Journigan	Aventon
	Kristy Ann Kaliopé	Hendersonville, TN
	Pamela Ann Ketchie	Selma
HS***	Kristine Josephine Lang	Havelock
**	Christina Linnea Law	Durham
	James Allen Lee III	Monroe
	Lori Melinda Leonard	Vale
HS***	Laurie Ann Lyon	Sanford
	Shoshanna Lynn Martin	Statesville
**	Wrenn Williams Matthis	Clinton
H*	Rachel Maria McNeil	Durham
	Amy Annette Mitchell	Hickory

	Sheri Anne Mitchell	Cary
**	Omayra Montalvo	Sabana Grande, Puerto Rico
	Sarah Paige Morgan	Durham
S*	Heather Brooke Murphy	Durham
**	Amy Jean Poole	Manteo
**	Milimar Rivera	Guaynabo, Puerto Rico
	Robyn Suzanne Sadler	Hobucken
	Allyson Michele Scott	Hubert
	Anthony Wayne Smith	Newton Grove
	Tonya Raquel Smith	Eure
*	Erik Stahl Strunck	West Chester, OH
	Angela Diane Thomas	Orlando, FL
H***	Lori Kay White	Raleigh
**	Stephanie Michelle Williamson	Washington
*	Anna Boone Wood	Zebulon
	Shannon Lee Woody	Elk Park
**	Elizabeth Ann Wright	Gloucester, VA
	Emily Jane Wylie	Bakersville
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	Russell Wayne Duncan, Jr.	Cary
	James Bryan Haywood	Troy
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**	Emily Dawn Mull	Newton
	Scott Allen Overton	Lexington
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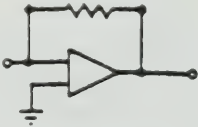
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Mark Raymond Sackfield II	Reidsville
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Iris Zoé Hernandez-Ramirez Serrano	Mayagüez, Puerto Rico
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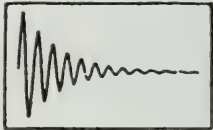
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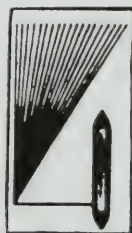
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Jeong Min Kim	Pusan, South Korea
Anand Sambath Kumar	Vellore, India
Shuping Li	Wuhan, People's Republic of China
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Zhongyan Wang	Beijing, People's Republic of China
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Lian Yan	Beijing, People's Republic of China

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Crop Science

Richard Robert Blum	Manilla, IA
Chad Joseph Kalaher	Litchfield, IL
Jimmy Ray Summerlin, Jr.	Tarboro

Ecology

Elizabeth Esther Fensin	New Orleans, LA
Angela Gale Poovey	Gaylord, MI

Electrical Engineering

David Gary Bentlage	Owego, NY
Jack Loren Burbank	Asheville
Rhonda Carpenter Cassada	Hillsborough
Carlos Enrique Christoffersen	Rosario, Argentina
Brian Edward Durham	Asheboro
Weidong Fan	Shanghai, People's Republic of China
Gregory Paul Goddu	Vernon, CT
Kristjan Hallvardsson	Kopavogur, Iceland
Ming-Yung Hsu	Hu-kou, Hsin-chu, Taiwan, Republic of China
Michael Christopher Hughes	Charlotte
Syed Asif Hussain	Lahore, Pakistan
Santosh Somakumaran Kolenchery	Bombay, India
Lisa Freeman Kovarik	Clayton
Bruce Richard Linnell	Raleigh
Keith Allan Miller	Landis
Bobak Modareess-Razavi	Charlotte
Mete Ozkar	Ankara, Turkey
Joseph Christopher Rizza	Peekskill, NY
Heinz Seltmann, Jr.	Raleigh
Kristine Maxine Singley	Fairfax Station, VA
Chadwin Delin Young	Georgetown, TX
Liang Zhang	Ninbo, People's Republic of China
Ze Zhang	Cary

Entomology

Siobhan Eileen O'Reilly	Morris, MN
Vernon Benno Schmidt	Pueblo West, CO

Food Science

Patricio Armando Carvajal Rondanelli	Talcahuano, Chile
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Tammy Lynn Hicks	Southern Pines
Charles Andrew Leduc	Kingston, RI
Paris Renae Leggitt	Lincoln, NE
Soraya Illyana Rosenfield	Stamford, CT
Melissa Christian Taylor	Dunn
Amy Elisabeth Thorne	Seneca, SC
Lisa Rebecca Wandling	Ft. Walton Beach, FL

Forestry

Anthony Joseph Cascio	Waynesboro, VA
Karen Renae Hall	Raleigh
Alexander Krings	Raleigh
Jimmy Dwight McKinney,	Greenville
Beverly Marie Mewborn	Cincinnati, OH

Higher Education Administration

Joseph Warren Wescott II	Wallace
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Horticultural Science

Richard Eric Cerny	Cobden, IL
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Industrial Engineering

Kenneth Edward Gregory	Bethel Park, PA
Robert Peter Maddalena	Flemington, NJ
Daniel Joseph Palko	Raleigh
Jennie Patricia Psihogios	Knoxville, TN
Mehmet Rustu Taner	Ankara, Turkey

Management

Kathleen Lynch Armstrong	Raleigh
James Ray Ball	Salisbury
Bridget Renee Berardinelli	Washington, PA
Carl Louis Bush III	Raleigh
Dennis Phillips Cope	Raleigh
Matthew Charles Jackson	Raleigh
Michael Edward Johnson	Fayetteville
Richard Floyd Kemp, Jr.	Raleigh
Michael Henry Loechel	Vandalia, OH
Steven Lawrence Magnusen	Cary
Nicole Barber McLamb	Benson
Rajeev Narayan	Raleigh
Atul George Peres-da-Silva	Mapusa, Goa, India
Clifton McCoy Preddy	Creedmoor
Christopher Edward Roach	Austin, TX
Gerald John Schie, Jr.	Raleigh
Manish Kashiram Shere	Cary
Yung-hwa Eva Wang	Taichung, Taiwan, Republic of China
Gary John Ward	Apex
Carol Lynn Wheatley	Durham
Paula Denise Woodall	Smithfield

Marine, Earth and Atmospheric Sciences

Bart Lewis Cattanaoh	Marion
Todd Norman Creamer	Westwood, MA
Donald Edward Daley	Endicott, NY
Elizabeth Anne C. Driscoll	Ithaca, NY
Billy Daniel Felton	Eure
Christopher Vandersip	Chesapeake, VA

Materials Science and Engineering

Wei Liu	Raleigh
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Mathematics

Rudolph McPherson Turner	Henderson
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Mechanical Engineering

Mohammad Javad Ahmadi-Torshizi	Raleigh
Christopher Michael Lewandowski	High Point
Lewis Arconza Moore	Brooklyn, NY
Jennifer Hodges Smith	Raleigh
Robert James Stevens	Durham

Natural Resources

Jefferson Forrest Essic	Mocksville
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Nutrition

Lori Ann Averette	Wilson
Duarte Eugenio Diaz Nazario	Raleigh
Leah Anne Mullis	Concord

Operations Research In Mathematics

Neil David Biehn	Belle Mead, NJ
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Parks, Recreation and Tourism Management

Tara Amelia Duncan	Spruce Pine
Alan Carl Pfau	Advance

Physics

Andrew James Stoltz, Jr.	Altoona, PA
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Physiology

John Grant Buttram, Jr.	Lincolnton
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Physiology

Christopher Brooks Moore	Kannapolis
Angela Leigh Peterson	Goldsboro

Psychology

Adriel Boals	Gainesville, FL
Melissa Dawn Juniper	Perkasie, PA
David Chip Lambert	Charlotte
James William Tarantino	Raleigh

Rural Sociology

Amanda Glyn Bailey	Wilson
Lisa Thomas Briggs	Asheville
Julio Fernando De Sousa, Jr.	Maputo, Mozambique

Soil Science

Robert Graber McBride	Ferndale, CA
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Technical Communication

Carrie Irish Finneran	New Canaan, CT
Robert Edward McCormick	Saint Pauls
Christine Pilla Nocito	Chapel Hill
Martin David Tomasi	Cary

Textile Engineering

Patrick Windham Duke	Greenville, SC
Jessica Leigh Zingelmann	Wilmington

Textiles

Steven Andrew Carmichael	Roanoke Rapids
Alice Susan Gordon	Wilson
Cynthia Ann Hodges	Concord
Kamal Lakshmi Rajagopalan	Madras, India
Jeffrey Aaron Rasmovich	Atlanta, GA
Carolyn Elizabeth Rendall	Greensboro
Geeta Srinivas Sunkara	Viskhapatnam, India

Wood and Paper Science

William Snow Small, Jr.	North, VA
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Zoology

Christopher Allen Beasley	Coeur D'alene, IA
Dawn Dorette Davis	New Orleans, LA
Farland Michael Holliman	Fort Smith, AR
Jeffery Allan Johnson	Raleigh
Jason Barry Searle	Ballston Lake, NY
Garrick Tyson Skalski	Asheville
Kimberly Lynn Sparks	Clifton Park, NY
Bryan Lynn Stuart	Sanibel Island, FL
Christian Tull Waters	New Bern

Doctor of Education Degrees

Ellen June Uhl Akhavein, Adult and Community College Education
Brookfield, Connecticut

Dissertation: *Insiders' Stories: Experiences Women with Mental Retardation Have with Employment: A Qualitative Study.* (Under the direction of J. Conrad Glass, Jr.)

Phyllis Jernigan Broughton, Adult and Community College Education
Winterville, North Carolina

Dissertation: *Examination of Learning Strategies Used by Community College Faculty in Preparing for the Online Delivery of Instruction.* (Under the direction of Rosemary Gillett-Karam.)

Sharon Diane Buddemeier, Higher Education Administration
Baltimore, Maryland

Dissertation: *Female Community College Presidents: Career Paths, Experiences and Perceptions of the Presidency.* (Under the direction of George B. Vaughan.)

John Rufus Craft, Technology Education
Boone, North Carolina

Dissertation: *The Identification of Technical Competency Areas and Subareas Essential for First-line Managers in the Digital Printing Industry.* (Under the direction of Richard E. Peterson.)

Michael Beuford Evers, Higher Education Administration
Marshal, Texas

Dissertation: *Workforce Preparedness Strategies: A Comparative Study of the United States' and Japan's Approaches to Workforce Preparedness.* (Under the direction of Edgar J. Boone.)

Diana Krieger Flynn, Adult and Community College Education
Benton Harbor, Michigan

Dissertation: *A Survey of Rural Preretirement Needs of the Middle Age Population in Selected Counties of North Carolina.* (Under the direction of J. Conrad Glass, Jr.)

Donna Gayle Greene, Higher Education Administration
Wake Forest, North Carolina

Dissertation: *Empowering Women Leaders in Higher Education.* (Under the direction of Rosemary Gillett-Karam.)

Carl Edward Harris, Educational Administration and Supervision
Louisburg, North Carolina

Dissertation: *Teacher Turnover: Factors Related to Attrition and Retention of North Carolina Teaching Fellows.* (Under the direction of Elizabeth MacPhail-Wilcox.)

Judith Coolidge Hughes, Adult and Community College Education
Franklin, North Carolina

Dissertation: *Perceptions of Why Academic Success Was Achieved in Associate Degree Nursing Programs.* (Under the direction of Don C. Locke.)

Paul Joseph Ilecki, Adult and Community College Education
Durham, North Carolina

Dissertation: *Becoming a Ph.D.: A Hermeneutic Phenomenology of a New Doctoral Student.* (Under the direction of Nancy E. Hagan and Rosemary Gillett-Karam.)

James Gregory Johnson, Adult and Community College Education

Midland, North Carolina

Dissertation: The Impact of the North Carolina Center for the Advancement of Teaching Seminars on African-American Teachers. (Under the direction of Don C. Locke.)

Dudley Lameck, Adult and Community College Education

Kilosa, Tanzania

Dissertation: The Adoption of Integrated Pest Management Practices and Pesticide Use among North Carolina Peanut Growers. (Under the direction of R. David Mustian.)

Fernando Manzo-Ramos, Adult and Community College Education

Mexico City, Mexico

Dissertation: The Organizational Climate of the North Carolina Cooperative Extension Service. (Under the direction of George A. Baker III.)

Angela Marie Mason, Higher Education Administration

Washington, North Carolina

Dissertation: Perceptions of Presidential Leadership by Chief Academic Officers and Their Relationships to Job Satisfaction, Motivation toward Extra Effort and Perceived Effectiveness in American Community Colleges: A Composite Model of Transformational and Transactional Leadership. (Under the direction of H. Duane Akroyd.)

Shirley Coggins Mason, Higher Education Administration

Chapel Hill, North Carolina

Dissertation: A Comparative Analysis of the Doctor of Education and Doctor of Philosophy Degrees in Higher Education: Expectations, Curriculums and Outcomes. (Under the direction of George A. Baker III.)

Valorie Ruth Freeman McAlpin, Adult and Community College Education

Greensboro, North Carolina

Dissertation: The Effects of Selected Factors on Academic Performance of On-line and Face-to-face Students. (Under the direction of R. David Mustian and Richard T. Liles.)

Tony Michael O'Driscoll, Adult and Community College Education

Youghal, Ireland

Dissertation: The Analysis, Development and Implementation of a Knowledge-based High Performance Work System: A Case Study of Corporate Innovation. (Under the direction of Don L. Martin and James L. Burrow.)

Carmen Leon Guerrero Pearson, Adult and Community College Education

Agana, Guam

Dissertation: Guam Cooperative Extension Service: The Public's Perception. (Under the direction of Rosemary Gillett-Karam.)

Sylvia Shearin Ross, Educational Administration and Supervision

Elm City, North Carolina

Dissertation: Organizational Effectiveness as Perceived by Middle School Mathematics and Communication Skills Teachers in North Carolina's Schools of Excellence, Schools of Distinction, Schools Making Exemplary Growth, Schools Making Expected Growth and Low-performing Schools. (Under the direction of Raymond G. Taylor, Jr.)

Lawrence Lee Rouse, Adult and Community College Education

Sumter, South Carolina

Dissertation: A Comparison of African-American and Anglo-European Community College Leaders. (Under the direction of Rosemary Gillett-Karam.)

- Cynthia Wall Sarwi, Higher Education Administration**
Greensboro, North Carolina
Dissertation: Sports and Educational Leadership: Past Organized Sports Participation and Leadership Styles of Community College Chief Academic Officers. (Under the direction of J. Conrad Glass, Jr.)
- Norman Glenn Shepherd, Curriculum and Instruction**
Mebane, North Carolina
Dissertation: The Probe Method: A Problem-based Learning Model's Affect on Critical Thinking Skills of Fourth and Fifth Grade Social Studies Students. (Under the direction of Ellen S. Vasu.)
- Michael Payegbay Slawon, Higher Education Administration**
Doumpa, Liberia
Dissertation: The Factors Influencing Non-return of African Graduate Students in the United States: The Study of Reverse Transfer of Human Capital. (Under the direction of Wynetta Y. Lee.)
- Donna Lee Wright, Adult and Community College Education**
Roanoke Rapids, North Carolina
Dissertation: Radiography Student Learning Style Preferences and Computer Readiness. (Under the direction of J. Conrad Glass, Jr.)
- ## Doctor of Philosophy Degrees
- Sinan Altug, Electrical Engineering**
Ankara, Turkey
Dissertation: Incipient Motor Fault Detection and Diagnosis via Heuristic Constraint Enforcement on Neural Fuzzy Architectures. (Under the direction of Mo-Yuen Chow.)
- John Anderson, Marine, Earth and Atmospheric Sciences**
Rockford, Illinois
Dissertation: A Study of Stratospheric Aerosol Characteristics Inferred from Remotely Sensed Satellite Data. (Under the direction of Vinod K. Saxena.)
- Pallasana Balasubramanyan Aruna, Forestry**
Bangalore, India
Dissertation: The Estimated Demand for Lake Recreation in North and South Carolina: A Nested RUM Approach. (Under the direction of Robert C. Abt.)
- Jill Akkerman Barnes, Comparative Biomedical Sciences**
Raleigh, North Carolina
Dissertation: The Expression of Glucose-regulated Proteins in Mouse Embryos during Normal and Abnormal Development. (Under the direction of Barry P. Peters.)
- Cem Başçeri, Materials Science and Engineering**
Ankara, Turkey
Dissertation: Electrical and Dielectric Properties of (Ba,Sr)TiO₃ Thin Film Capacitors for Ultra-high Density Dynamic Random Access Memories. (Under the direction of Angus I. Kingon.)
- Michael William Bauer, Chemical Engineering**
Mechanicsburg, Pennsylvania
Dissertation: Glycosyl Hydrolases from Hyperthermophilic Archaea. (Under the direction of Robert M. Kelly.)

Mark Conrad Benjamin, Physics

Gastonia, North Carolina

Dissertation: Electronic Properties of SiC and AlN Surfaces and Interfaces. (Under the direction of Robert J. Nemanich.)

Rajika Bhandari, Psychology

New Delhi, India

Dissertation: Education and Food Consumption Behavior in China: Household Analysis and Policy Implications. (Under the direction of Frank J. Smith.)

Girish Shivanand Bhat, Computer Science

Madras, India

Dissertation: Tableau-based Approaches to Model-checking. (Under the direction of W. Rance Cleaveland II.)

Maria Lynn Blanton, Mathematics Education

Willard, North Carolina

Dissertation: Prospective Teachers' Emerging Pedagogical Content Knowledge during the Professional Semester: A Vygotskian Perspective on Teacher Development. (Under the direction of Sarah B. Berenson and Karen S. Norwood.)

Leland Scott Bloebaum, Electrical Engineering

Ashland, Kentucky

Dissertation: Transform Techniques for Reducing the Peak Power in Orthogonal Frequency-division Multiplexed Systems. (Under the direction of S. Thomas Alexander and Alexandra Duel-Hallen.)

Theodore Joseph Branoff, Curriculum and Instruction

Zebulon, North Carolina

Dissertation: The Effects of Adding Coordinate Axes to a Mental Rotations Task in Measuring Spatial Visualization Ability: An Information-processing Approach Relating to Teaching Methods of Undergraduate Technical Graphics Education. (Under the direction of Ellen S. Vasu.)

Alfred Bryant, Jr., Counselor Education

Pembroke, North Carolina

Dissertation: A Validation of Helms' People of Color Identity Attitude Scale with a Native-American College Student Population. (Under the direction of Stanley B. Baker.)

Salih Muhsin Celik, Electrical Engineering

Ankara, Turkey

Dissertation: Low Thermal Budget Surface Preparation for Selective Silicon Epitaxy. (Under the direction of Mehmet C. Ozturk.)

Linda Marett Chappell, Economics

Raleigh, North Carolina

Dissertation: The Effects of Regulation on the Diffusion of Technological Innovation in the Local Telephone Industry in the United States. (Under the direction of Stephen E. Margolis.)

Sreeram Chivukula, Wood and Paper Science

Ongole, India

Dissertation: Effect of Pre-treatments on Extending Delignification. (Under the direction of Hasan Jameel.)

Shin-Jung Yoo Choi, Fiber and Polymer Science

Seoul, South Korea

Dissertation: Relationship Between Material Properties and Human Sensorial Comfort in Transient Conditions of Wear. (Under the direction of Roger L. Barker.)

David Langton Clarke, Psychology

Stockton, California

Dissertation: Errors in the Perception of Motion in Depth: Effects of a Structured Field-of-view. (Under the direction of Donald H. Mershon.)

William David Crank, Mechanical Engineering

Manhattan, Kansas

Dissertation: Response of an Elastic Layer Which Separates a Vibrating Plate from an Acoustic Half-space. (Under the direction of Richard F. Keltie.)

Dorothy Estelle Crissman, Curriculum and Instruction

Raleigh, North Carolina

Dissertation: Writing Life. (Under the direction of Carol A. Pope.)

Robert Andrew Cushman, Physiology

East Kyme, Connecticut

Dissertation: Control of Folliculogenesis in Cattle. (Under the direction of Jack H. Britt and Steven P. Washburn.)

Norma Lynn Day-Vines, Counselor Education

Mt. Holly, New Jersey

Dissertation: Study Abroad: An Investigation of the Impact of African Diasporic Travel on the Psychosocial Development of African-American College Sojourners. (Under the direction of Herbert A. Exum.)

Olga Beatrice d'Hennezel, Chemical Engineering

Paris, France

Dissertation: Chlorine-enhanced Gas-solid Photocatalysis: Trichloroethylene Promotion, TiO_2 Pre-chlorination, Mechanistic Correlations, Intermediates Identification. (Under the direction of David F. Ollis.)

Paritosh Dixit, Computer Engineering and Statistics

New Delhi, India

Dissertation: Quality of Service Modeling for Wide Area Network Based Systems. (Under the direction of Mladen A. Vouk and Sastry G. Pantula.)

Michael Robert Easterling, Biomathematics

Albuquerque, New Mexico

Dissertation: The Integral Projection Model: Theory, Analysis and Application. (Under the direction of Stephen P. Ellner.)

Chandrika Padmini Ediriwickrema, Immunology

Maharagama, Sri Lanka

Dissertation: High Molecular Weight-Dextran-Peptide Conjugate Enhancement of Peptide Specific Antibody: Dependence upon Macrophage Regulated Natural Killer Cell Production of Interferon Gamma. (Under the direction of Bruce Hammerberg.)

Barry Allen Evans, Statistics

Coeburn, Virginia

Dissertation: Estimation and Hypothesis Testing in Nonstationary Time Series Using Frequency Domain Methods. (Under the direction of David A. Dickey.)

Armando Ferrufino-Coqueugniot, Soil Science

Cochabamba, Bolivia

Dissertation: Comparative Root Growth of Soybean Genotypes to Subsurface Acidity Constraints. (Under the direction of T. Jot Smyth.)

Tracy Lawrence Fulghum, Electrical Engineering

Wilson, North Carolina

Dissertation: Adaptive Multielement Decision Feedback Receiver Structures for Narrowband Multiuser Detection in a Frequency Selective Channel. (Under the direction of Alexandra Duel-Hallen.)

Dannellia Banay Gladden-Green, Materials Science and Engineering

Richmond, Virginia

Dissertation: Materials Characterization of Rapid Thermal Chemical Vapor Deposition of Titanium Disilicide. (Under the direction of Mehmet C. Ozturk and Dennis M. Maher.)

Karl McClellan Glasener, Soil Science

Washington, District Of Columbia

Dissertation: Synchrony Between N Release from ^{15}N -foliarly-labeled Tropical Legume Mulches and Plant N Uptake. (Under the direction of Michael G. Wagger.)

Jeremy Philip Goodwin, Computer Engineering

Raleigh, North Carolina

Dissertation: A Measurement Methodology for the Optimization of Programming Language Features. (Under the direction of Edward F. Gehringer and Kuo-Chung Tai.)

Lynne Croteau Gregorio, Mathematics Education

Apex, North Carolina

Dissertation: Procedural and Conceptual Knowledge of Media among Inservice Elementary and Preservice Middle School Teachers. (Under the direction of Sarah B. Berenson.)

Peter Garth Hardy, Mathematics

West Bowdoin, Maine

Dissertation: On Characterizing Nilpotent Lie Algebras by Their Multipliers, $\iota(L) \leq 8$. (Under the direction of Ernest L. Stitzinger.)

Scott Alan Heppell, Physiology

Tigard, Oregon

Dissertation: The Reproductive Physiology of Gag Grouper, *Mycteroperca microlepis*. (Under the direction of Craig V. Sullivan.)

Michael Tyler Hicks, Chemical Engineering

Cincinnati, Ohio

Dissertation: The Electrooxidative Dimerization of Acetic Acid. (Under the direction of Peter S. Fedkiw.)

Lei Huang, Fiber and Polymer Science

Changsha, People's Republic of China

Dissertation: Polymer Inclusion Compounds. (Under the direction of Alan E. Tonelli.)

Hsiu-cheng Hung, Microbiology

Taipei, Taiwan, Republic of China

Dissertation: Investigation of the Role of Geminivirus Late Gene *Trans*-activation in Host Adaptation and Its Application in Resistance Engineering. (Under the direction of Ian T. D. Petty.)

Huan-Sheng Hwang, Electrical Engineering

Kaohsiung, Taiwan, Republic of China

Dissertation: A Two Dimensional Quasi-optical Microwave Power Combining System Based on a Dielectric Slab. (Under the direction of Michael B. Steer.)

- Bruce Joseph Ikelheimer, Mechanical Engineering**
Piermont, New York
Dissertation: Active Noise Control of a Model Propeller. (Under the direction of Robert T. Nagel.)
- Michael Allen Jeffris, Applied Mathematics**
Ridgecrest, California
Dissertation: Analysis and Simulations of Unsaturated Groundwater Flow in Heterogeneous Media. (Under the direction of Ben G. Fitzpatrick.)
- Robert Howard Jenkins, Psychology**
Fayetteville, North Carolina
Dissertation: Contextual and Social Network Factors Related to Child Care and Child Health among Low Income Families. (Under the direction of Craig C. Brookins and Denis O. Gray.)
- Sidney Thomas Johnson, Curriculum and Instruction**
Morrisville, North Carolina
Dissertation: Writing to Learn Physics: The Effectiveness of Personal Analytic and Formal Analytic Essays as Methods of Writing to Learn in High School Physics Classes. (Under the direction of Ruie J. Pritchard.)
- Jeffrey Nicholas Jonkman, Statistics**
Grand Rapids, Michigan
Dissertation: Estimation of Percentiles Using Group Testing When the Underlying Response Variable Is Continuous. (Under the direction of William H. Swallow.)
- David Edward Keller, Chemical Engineering**
Birmingham, Alabama
Dissertation: Protein Separations on Surfactant-adsorbed Octadecyl Silicia. (Under the direction of Ruben G. Carbonell and Peter K. Kilpatrick.)
- Michael Owusu Kyereme, Food Science**
Akumadan, Ghana
Dissertation: Theoretical and Mathematical Validation of the Equivalent Point Method for Thermal Process Evaluation. (Under the direction of Kenneth R. Swartzel and Brian E. Farkas.)
- Christopher Jay Lacke, Operations Research**
Portland, Maine
Dissertation: Decision Analytic Modeling of Colorectal Cancer Screening Policies. (Under the direction of Yahya Fathi and John F. Monahan.)
- Amy Lee Lambert, Entomology**
Tifton, Georgia
Dissertation: Entomological Consequences of Transgenically Altered Insect Resistant Cottons (*Gossypium hirsutum* L.) in the Coastal Plain of North Carolina. (Under the direction of Julius R. Bradley, Jr. and John W. Van Duyn.)
- Jonathan Harold Laurer, Materials Science and Engineering**
Raleigh, North Carolina
Dissertation: Morphology and Property Studies of ABA and A(A/B)B Copolymers, Blends and Gels. (Under the direction of Richard J. Spontak.)
- Heather Ann Lee, Psychology**
Chapel Hill, North Carolina
Dissertation: Non-disabled Employees' Attitudes Toward the Americans with Disability Act Requirement to Reasonably Accommodate Co-workers with Disabilities. (Under the direction of Samuel B. Pond III and Rupert W. Nacoste.)

Taiyeong Lee, Statistics

Kimhae, South Korea

Dissertation: Unit Root Tests in Nonstationary Time Series. (Under the direction of David A. Dickey.)

Daniel Hopkins Loughlin, Civil Engineering

Fayetteville, North Carolina

Dissertation: Genetic Algorithm-based Optimization in the Development of Tropospheric Ozone Control Strategies. (Under the direction of E. Downey Brill, Jr. and S. Ranji Ranjithan.)

Jianjun Lu, Operations Research

Beijing, People's Republic of China

Dissertation: Fuzzy Abductive Reasoning with Applications. (Under the direction of Shu-Cherng Fang and Elmor L. Peterson.)

Te-Hsin Lung, Statistics

Taipei, Taiwan, Republic of China

Dissertation: Approximations for Skewed Probability Densities Based on Laguerre Series and Biological Applications. (Under the direction of Charles E. Smith.)

Christopher Mark Lyerly, Mathematics

Hickory, North Carolina

Dissertation: Explicit Construction of a Level-two Representation of $G_2^{(1)}$. (Under the direction of Naihuan Jing.)

Thomas Rüdiger Malow, Materials Science and Engineering

Berlin, Germany

Dissertation: Thermal Stability and Mechanical Behavior of Nanocrystalline Iron. (Under the direction of Carl C. Koch.)

Lucymarie Mantese, Physics

St. Louis, Missouri

Dissertation: Surface-induced Optical Anisotropies of Si and Ge. (Under the direction of David E. Aspnes.)

Cheryl LaRay Mason, Curriculum and Instruction

Richmond, Virginia

Dissertation: An Analysis of Patterns of Computer Mediated Communication with the Social Studies Student Teaching Experience. (Under the direction of Peter H. Martorella.)

Christopher Carroll McDowell, Chemical Engineering

Richmond, Virginia

Dissertation: Sorption and Transport of Acetone in Random Copolymers of Poly(ethylene Terephthalate) and Poly(ethylene 2,6-naphthalate). (Under the direction of Benny D. Freeman and Harold B. Hopfenberg.)

Alberico Menozzi, Electrical Engineering

Rome, Italy

Dissertation: A Multi-resolution Associative Memory Network for Real-time System Identification and Control. (Under the direction of Mo-Yuen Chow.)

Agita Tjandra Mohammad, Biological and Agricultural Engineering

Payakumbuh, West Sumatera, Indonesia

Dissertation: Evaluation of Surface Runoff Water Quality Prediction under Different Water Table Management Practices. (Under the direction of R. Wayne Skaggs and John E. Parsons.)

- William Robinson Moore, Jr., Educational Research and Policy Analysis**
Raleigh, North Carolina
Dissertation: A Descriptive Analysis of a Student Mentoring Program in a Correctional Setting. (Under the direction of Paul F. Bitting.)
- James Theodore Morris, Forestry**
Tucson, Arizona
Dissertation: Conservation Decisions of Agricultural Producers in Eastern North Carolina. (Under the direction of Peter T. Bromley.)
- Carsten Mundt, Electrical Engineering**
Berlin, Germany
Dissertation: Miniaturized Signal Conditioning System for Kapton®-Based Biopotential and Ion-selective Electrode Arrays. (Under the direction of H. Troy Nagle, Jr. and Ronald S. Gyurcsik.)
- Praveen Muraleedharan, Electrical Engineering**
Alleppey, India
Dissertation: High Voltage Buried Junction Vertical Silicon Carbide Field Effect Transistors. (Under the direction of B. Jayant Baliga.)
- John Franklyn Muth, Physics**
Rockfield, Kentucky
Dissertation: Optical Characterization of Gallium Nitride and Zinc Oxide. (Under the direction of Robert M. Kolbas.)
- Suneeta Shamanna Neogi, Materials Science and Engineering**
Bangalore, India
Dissertation: Two-dimensional Dopant Analysis in Silicon Using Chemical Etching and Transmission Electron Microscopy. (Under the direction of Dennis M. Maher.)
- Tenson Boyd Symon Ng'ambi, Crop Science**
Lilongwe, Malawi
Dissertation: Sources and Genetic Basis of Resistance to Root-knot Nematodes in Tobacco. (Under the direction of Rebeca C. Rufty.)
- Jennifer Brock O'Brien, Microbiology**
Jackson, Mississippi
Dissertation: The Sustained Phosphorylation of cPLA₂ Accompanies Cycloheximide and Adenovirus-induced Susceptibility to TNF: Adenovirus E1A Has Diverse Effects on the Regulation of cPLA₂. (Under the direction of Scott M. Laster.)
- Zeydy Ortiz-Laureano, Computer Science**
Carolina, Puerto Rico
Dissertation: Techniques to Support Multicast Traffic in Single-hop WDM Optical Networks. (Under the direction of Harry G. Perros and George N. Rouskas.)
- Christopher Gerald Parker, Electrical Engineering**
Pensacola, Florida
Dissertation: Device Quality Remote Plasma-enhanced Chemical Vapor Deposited (RPECVD) Gate Dielectrics for MOS Applications. (Under the direction of John R. Hauser.)
- Edwin Lanier Piner, Materials Science and Engineering**
Smyrna, North Carolina
Dissertation: Growth and Characterization of Metalorganic Chemical Vapor Deposition InGaN. (Under the direction of Nadia A. El-Masry.)

Rohini Raghunathan, Electrical Engineering

Madras, India

Dissertation: Measurement of Impact Ionization Coefficients in Silicon Carbide. (Under the direction of B. Jayant Baliga.)

John Douglas Roberts, Comparative Biomedical Sciences

Churdan, Iowa

Dissertation: Assessing Body Weight Variation in Swine. (Under the direction of Jay F. Levine and John Deen.)

Sumedh Wasudeo Sathaye, Computer Engineering

Raleigh, North Carolina

Dissertation: Evolutionary Compilation for Object Code Compatibility and Performance. (Under the direction of Thomas M. Conte.)

Christopher Scarfone, Physics

Las Cruces, New Mexico

Dissertation: Quantitative Pulmonary Single Photon Emission Computed Tomography (SPECT) with Radio-therapy Applications. (Under the direction of Dale E. Sayers.)

Mike Andreas Schmidt, Mathematics

Raleigh, North Carolina

Dissertation: Quotient Rings of Γ -rings. (Under the direction of Jiang Luh.)

Vann Barden Scott, Jr., Psychology

Charlotte, North Carolina

Dissertation: The Effect of Ruminative Thoughts on Cognitive Processing Resources. (Under the direction of Katherine W. Klein.)

Sarid Moshe Shefet, Food Science

Givatayim, Israel

Dissertation: Development of a Quantitative Visualization Method to Characterize the Flow Behavior of Food Particulates in a Continuous Aseptic Sterilizer (Under the direction of Brian W. Sheldon and Kenneth R. Swartzel.)

Mark Alan Shields, Marine, Earth and Atmospheric Sciences

Holly Ridge, North Carolina

Dissertation: Proximate and Ultimate Causes of Hatching Asynchrony in the Brown Pelican. (Under the direction of James T. Powell and Thomas G. Wolcott.)

Kurex Sidik, Statistics

People's Republic of China

Dissertation: Exact Unconditional Tests for Discrete Data. (Under the direction of Roger L. Berger.)

Josip Simunovic, Food Science

Osijek, Croatia

Dissertation: Particle Flow Monitoring in Multiphase Aseptic Systems. (Under the direction of Kenneth R. Swartzel and Brian E. Farkas.)

Hanijanto Soewandi, Operations Research

Surabaya, Indonesia

Dissertation: Sequencing Jobs on Two- and Three-stage Hybrid Flowshop to Minimize Makespan. (Under the direction of Salah E. Elmaghraby.)

Srikant Sridevan, Electrical Engineering
Madras, India
Dissertation: Characterization of Inversion Layers on SiC. (Under the direction of B. Jayant Baliga.)

David Robert Stevens, Animal Science and Crop Science
Core, New Zealand
Dissertation: Nitrogen and Carbohydrate Fractions in Grasses: Their Role in the Voluntary Feed Intake of Sheep. (Under the direction of Joseph C. Burns and Joan H. Eisemann.)

John Wesley Stuart, Biochemistry
New Bern, North Carolina
Dissertation: Using Molecular Modeling to Understand RNA Structure. (Under the direction of Paul F. Agris.)

Nkadi Sukidi, Materials Science and Engineering
Kinshasa, Congo
Dissertation: Heteroepitaxy of Group-III Phosphides on Silicon. (Under the direction of Klaus J. Bachmann.)

Michael David Tocci, Applied Mathematics
Franklin, Massachusetts
Dissertation: Numerical Methods for Variably Saturated Flow and Transport Models. (Under the direction of C. Timothy Kelley.)

Paa-Kobina Turkson, Veterinary Medical Sciences
Salt Pond, Ghana
Dissertation: Systems Analysis of Privatization of Animal Health Delivery Services in Ghana and Jamaica. (Under the direction of Cecil F. Brownie.)

Bekir Ulker, Crop Science
Sivas, Turkey
Dissertation: The Effects of Matrix Attachment Regions (MARs) on Transgene Expression in Tobacco Plants. (Under the direction of Arthur K. Weissinger and William F. Thompson.)

Somasundaram Velumyylum, Mathematics
Joffna, Sri Lanka
Dissertation: Internal Transition layers in Singularly Perturbed Boundary Value Problems. (Under the direction of Xiao-Biao Lin.)

Joseph Robb Walston, Physics
Durham, North Carolina
Dissertation: Determination of the Nucleon-Nucleon Tensor Force through $n - p$ Scattering Measurements. (Under the direction of Christopher R. Gould.)

Fang Wang, Chemistry
Haining City, People's Republic of China
Dissertation: Enhancement of Selectivity and Resolution in Chiral Separation by Capillary Electrophoresis in Aqueous and Nonaqueous Media. (Under the direction of Morteza G. Khaledi.)

Mabel Yvette Watson, Computer Engineering
Smithfield, North Carolina
Dissertation: Efficient Allocation of Idle Bandwidth in CDMA. (Under the direction of Tony L. Mitchell.)

Alexander J. Weintraub, Industrial Engineering

New York, New York

Dissertation: Scheduling with Alternatives in a Resource Constrained Environment. (Under the direction of Denis R. Cormier and Thom J. Hodgson.)

Christopher John Williams, Physiology

Apex, North Carolina

Dissertation: Evaluation of Fungal Control Strategies Used in Conjunction with Late Embryonic Injection. (Under the direction of John T. Brake.)

Margaret Mary Wong, Psychology

Accokeek, Maryland

Dissertation: Patterns of Special Education Placement for Preschool and School-age Children. (Under the direction of Ann C. Schulte and Mary E. Haskett.)

Sheila Wright, Curriculum and Instruction

Garysburg, North Carolina

Dissertation: Creativity, Motivation and "Defiant" Behavior: Young Adolescents' Perceptions of a Middle School Experience. (Under the direction of John F. Arnold.)

Laura Wittmer Wyatt, Psychology

Raleigh, North Carolina

Dissertation: Attributional Style of Aggressive and Nonaggressive Adolescents in Teacher-Student Situations. (Under the direction of Mary E. Haskett and William P. Erchul.)

Shu Yang, Economics

Chengdu, People's Republic of China

Dissertation: Modeling Structural Change in the U.S. Textile Industry. (Under the direction of Barry K. Goodwin.)

Zhiping Yang, Applied Mathematics

Raleigh, North Carolina

Dissertation: Monotone Methods for Analytic and Numerical Solutions of Reaction Diffusion Systems. (Under the direction of Chia-Ven Pao.)

Kevin Dean Yeomans, Applied Mathematics

Lumber City, Georgia

Dissertation: Initialization Issues in General Differential Algebraic Equation Integrators. (Under the direction of Stephen L. Campbell.)

Jun Zhai, Statistics

Nanjing, People's Republic of China

Dissertation: Multiresolution Analysis of Random Processes with Application on Numerical Model Evaluation. (Under the direction of Douglas W. Nychka.)

Ancheng Zhou, Food Science

Beijing, People's Republic of China

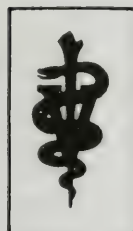
Dissertation: Effects of Fermentation, Oxygen and Antioxidants on the Volatile Flavor Components in Fermented Cucumbers. (Under the direction of Roger F. McFeeters.)

Andrew Zozom, Jr., Industrial Engineering

West Milford, New Jersey

Dissertation: A Finite Capacity Job Shop Planning and Scheduling System. (Under the direction of Thom J. Hodgson and Russell E. King.)

Doctor of Veterinary Medicine Degrees



Derron Anthony Alves	Hampton, VA
Dempsey Maryland Ange III	Belhaven
Rebecca Ann Arthur	Fawn Grove, PA
James Patrick Barker	Shelby
Thomas Edward Beacom	Raleigh
Amo B. Burbridge	Jacksonville, FL
Jill Katherine Clark	Greensboro
Johanna Briggs Clark	Wilson
Laurin Hayworth Cooke	Ocean Isle Beach
Anthony Scott Creech	Zebulon
Michelle Lee Crosier	Camden, DE
Donna Tyson Dishman	Wilson
David Henry Doyens	Chicago, IL
Kathryn Lee Ellmore	Ahoskie
Michele Joyce Ewing	Huntingdon, PA
Brooke Tillou Ferguson	Raleigh
Marisara Fernandez	San German, Puerto Rico
Geoffrey Ronald Frattini	East Haven, CT
Christine Susan Ganley	Middletown, MD
Katherine Ann Garner	Morehead City
Susan Mary Geske	Cary
Scotty Alan Gibbs	Waynesville
Victoria Marie Graham	Henderson
Nanette Lynn Hanshaw	Palmyra, PA
Ashley Elizabeth Horsman	Monroe
Jeannine Michelle Hostetter	Chambersburg, PA
Mary Louise James	Chicopee, MA
Carrie Beth Jelovich	Tarboro
Amy Catherine Johnson	Medford, MA
Jacob Alexander Johnson	Trinity
Thearayouk Keo	Greensboro
Sharon Beeson King	Liberty
Diona Leigh Krahn	Rockingham
Sarah Marie Long	Charlotte
Julie Turpin McCormick	Brevard
Robbie Jones McCracken	Hendersonville
Mark Allan McGeough	Newport, RI
Amanda Lee McKee	Burlington
Joyce Ruth McMillian	Pilot Mountain
Nicola Joanne Melliard-Smith	Austin
Jennifer Elizabeth Neal	Niskayuna, NY
Glenda Allen Noble	Woodleaf
Cheryl Cheves Noe	Bunn
Lea Grace Osborne	Weaverville
Melinda Anne Perry	Fuquay-Varina
Nancy Christine Peters	Alexandria, VA
Amy Forister Pruitt	Ruffin

Lesli Rosfeld Reiff	Washington, DC
Jamie Ruth Rhoades	North Wilkesboro
Stacy Kay Robinson	Holy Springs
Lance Chandler Rozear	Durham
Janine Sagris	Wilson
Amber Elizabeth Seals	North Wilkesboro
Noelle Ann Serocki	Centereach, NY
Basil Otto Sharp	Washington, DC
Bonnie Jean Smith	Jacksonville
Katherine Elaine Smith	West Henrietta, NY
John Mitchell Troutman	Raleigh
Karen Lynn Tyndall	Chapel Hill
Karen Kristine Tysinger	Raleigh
Sara Carpenter White	Winston-Salem
Annette Ward Whited	Wilmington
James Thomas Winkler	Statesville
Richard Jay Wittmann	La Mesa, CA
Caroline Baugh Yancey	Charlotte
Shayne Philana Zimmerman	Chicago, IL

BOARD OF GOVERNORS' AWARD FOR EXCELLENCE IN TEACHING

<i>Name</i>	<i>Department and College</i>
Dr. Robert L. Beckmann	Department of Botany/Biological Sciences College of Agriculture and Life Sciences

BOARD OF GOVERNORS' AWARD FOR EXCELLENCE IN TEACHING COLLEGE NOMINEES

<i>Name</i>	<i>Department and College</i>
Dr. Robert L. Beckmann	Department of Botany/Biological Sciences College of Agriculture and Life Sciences
Dr. Richard R. Braham	Department of Forestry College of Forest Resources
Dr. Frank A.O. Buckless	Department of Accounting College of Management
Dr. Roger H. Clark	Department of Architecture School of Design
Dr. E. Jacquelin Dietz	Department of Statistics College of Physical and Mathematical Sciences
Dr. J. Michael Grimwood	Department of English College of Humanities and Social Sciences
Dr. Rupert W. Nacoste	Department of Psychology College of Education and Psychology
Dr. Jon P. Rust	Department of Textile Engineering, Chemistry and Science College of Textiles
Dr. James E. Smallwood	Department of Anatomy, Physiological Sciences and Radiology College of Veterinary Medicine

UNDERGRADUATE ALUMNI DISTINGUISHED PROFESSORS

<i>Name</i>	<i>Department and College</i>
Dr. Daniel A. DeJoy	Department of Communication College of Humanities and Social Sciences
Dr. William L. Flowers	Department of Animal Science College of Agriculture and Life Sciences
Dr. David N. Hyman	Department of Economics College of Management
Dr. C. Ernest Knowles	Department of Marine, Earth and Atmospheric Sciences College of Physical and Mathematical Sciences
Dr. Carolyn S. Miller	Department of Computer Science College of Engineering
Dr. J. Wayne Place	Department of Architecture School of Design

GRADUATE ALUMNI DISTINGUISHED PROFESSORS

<i>Name</i>	<i>Department and College</i>
Dr. Kenneth Adler	Head of the Department of Anatomy, Physiological Sciences & Radiology College of Veterinary Medicine
Dr. Carol K. Hall	Professor of Chemical Engineering College of Engineering
Dr. Salah Bedair	Professor of Electrical and Computer Engineering College of Engineering

ALUMNI AWARD IN OUTREACH AND EXTENSION

<i>Name</i>	<i>College</i>
Ms. Martha H. Isenberg	College of Agriculture and Life Sciences
Dr. Gregory D. Jennings	College of Agriculture and Life Sciences
Dr. John C. Park	College of Education and Psychology

ALUMNI OUTSTANDING RESEARCH AWARD

<i>Name</i>	<i>Department and College</i>
Dr. Shu-Cherng Fang	Department of Industrial Engineering and Operations Research College of Engineering
Dr. James D. Otvos	Department of Biochemistry College of Agriculture and Life Sciences
Dr. John M. Riddle	Department of History College of Humanities and Social Sciences

OUTSTANDING TEACHERS FOR 1997-98

<i>Name</i>	<i>Department and College</i>
Dr. Robert J. Beichner	Department of Physics College of Physical and Mathematical Sciences
Dr. Glenda S. Carter	Department of Mathematics, Science and Technology Education College of Education and Psychology
Dr. Philip B. Carter	Department of Microbiology, Pathology, and Parasitology College of Veterinary Medicine
Dr. Vern L. Christensen	Department of Poultry Science College of Agriculture and Life Sciences
Dr. Mary Kathleen Cunningham	Department of Philosophy and Religion College of Humanities and Social Sciences
Dr. Edward W. Davis	Department of Computer Science College of Engineering
Dr. Aly El-Shiekh	Department of Textile and Apparel, Technology and Management College of Textiles
Dr. Ronald O. Fulp	Department of Mathematics College of Physical and Mathematical Sciences
Dr. Barry Goldfarb	Department of Forestry College of Forest Resources
Dr. Martha J. Groom	Department of Zoology College of Agriculture and Life Sciences

Dr. Richard R. Johnson	Department of Mechanical and Aerospace Engineering College of Engineering
Dr. James A. Knopp	Department of Biochemistry College of Agriculture and Life Sciences
Mr. Bryan Laffitte	Department of Design and Technology School of Design
Mr. George C. Marsh	Department of Accounting College of Management
Dr. Arnold W. Oltmans	Department of Agricultural and Resource Economics College of Agriculture and Life Sciences
Dr. Anne L. Schiller	Department of Sociology and Anthropology College of Humanities and Social Sciences
Dr. Akhtarhusein A. Tayebali	Department of Civil Engineering College of Engineering

AWARDS FOR ACHIEVEMENT 1997-98

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Highest Ranking Scholars: David W. Grantham, Hickory; Darsey C. MacPhail, Cary; Russell J. Norri New Bern; Dharti A. Patel, Cary; Jennifer J. Peterson, Crest Hill, IL; Lynn J. Rubin, Swansboro

Agri-Life Council Outstanding Club Member Awards:

African American Science and Health Society: Eula L. Teague, Battleboro

Agri-Business/National Agri-Marketing Association: Brandon Lee Warren, Newton Grove

Agricultural and Extension Education: Robert J. Walls, Goldsboro

Agronomy: George H. Scott, Milton; Christopher T. Simms, Sedley, VA

Animal Science: Heidi H. Friedlein, Durham

Biochemistry: Charles P. Moon, Greensboro

Biological and Agricultural Engineering: Engineering Curriculum - James W. Howard, Lucama
Technology Curriculum - James L. Millard, Mt. Olive

Biology: Paphaphone Thirakoune, Raleigh

Collegiate 4-H Club: Helen E. Bustle, Statesville

Food Science: Heather Hickman, Sanford

Horticultural Science: Nicole L. Marshall, West Chester, PA

Jeffersonians Club: Katherine E. Barger, Raleigh; Jason P. Burton, Conover

Patricia M. Festin, Raleigh; David W. Grantham, Hickory; Clarence H. Moye, Farmville

Hiroshi N. Neutze, Jacksonville; Elizabeth A. Smith, Ayden; Paul H. Zigas, Chapel Hill

Poultry Science: Steven M. Turner, Laurinburg

Pre-Medical and Pre-Dental: David Grantham, Hickory

Pre-Veterinary: Deborah A. Tobin, Raleigh

Wildlife Biology: Daniel Tenney, Franklin

Agricultural and Extension Education

Outstanding Senior: Jeremy B. Johnson, Tryon

Agricultural and Resource Economics

Outstanding Senior: Tammara Leigh Cole, Arden

Scholastic Achievement: Gregory Scott Butler, Windsor, VA

Wall Street Journal Student Achievement: Petra Rijdes, Hillsborough

Agronomy

Senior Highest Scholastic Average in the Agronomy Club: Amy M. Mabery, Newton

American Society of Agronomy Award, Most Outstanding Senior: George H. Scott, Milton

Agronomy Club Leadership Award: Andrew W. Burleson, Richfield

Crop and Soil Science Senior Highest Scholastic Average: Amy M. Mabery, Newton

Animal Science

Most Outstanding Club Member: Heidi H. Friedlein, Durham

Most Outstanding Senior: Tonya R. Smith, Eure

Outstanding Senior in Animal Science: Katherine E. Barger, Davidson

Most Outstanding New Club Member: Charles M. McCoy, Cove City

American Society of Animal Science Undergraduate Awards:

Michelle L. Arrighi, Mt. Pleasant; Katherine E. Barger, Raleigh; Cortney C. Barkley, Belmont; Mary C. Bond, Winston-Salem; Karen E. Burlone, Asheville; Rachael E. Eckert, Wilson; Rebecca E. Ehrhardt, Julian; Sharon T. Finster, Raleigh; Derek M. Foster, Mocksville; Heidi H. Friedlein, Durham; Michael G. Gonda, Cary; Merritt A. Graham, Raleigh; William H. Hasskamp, Candler; Ralph L. House, Bakersville; Jennifer A. Huffman, Hickory; Jonathan P. Jackson, Hendersonville; Heather K. Jones, Madison; Carie A. Keller, Fuquay-Varina; Barbara K. Kirch, Carrboro; Adam L. Lane, Blanch; Kristine J. Lang, Havelock; Christina L. Law, Durham; Richard R. Luce, Raleigh; Laurie A. Lyon, Sanford; Jessica L. Manzak, Apex; Omayra Montalvo, Raleigh; Jennifer G. Montgomery, Monroe; James E. Mullen, Spring Hope; Ethan C. Myers, Union Grove; Joanna C. Nelson, Princeton, IL; Jessica C. Pfohl, Fayetteville; Jennifer C. Pickens, Pembroke; Amy J. Poole, Manteo; Amy E. Poulin, Charlotte; Amy M. Reeves, Leicester; Kristian S. Rhein, Raleigh; Loretta Pesteau-Somogyi, Weldon; Gretchen H. Thompson, Raleigh; Clarence W. Thompson, Carthage; Alexis S. Vidaurri, Raleigh; Elizabeth A. Walkup, Charlotte; Lori K. White, Raleigh; John C. Wilkins, Siloam; Stephanie M. Williamson, Washington; Meri F. Winchester, Franklinton; Kevin D. Woolard, Raleigh

Biochemistry

H. Robert Horton Award: Todd Stephen Shatynski, Schenectady, NY

Botany

Scholastic Achievement Award: Ethan Victor Brown, Fort Bragg

Food Science

B. M. Newell Award: Melissa Fenn, Raleigh

Forbes Leadership Award: Staci McNair, Raleigh

ADMCOCO Top Scholar Award: Heather Hickman, Sanford

Leonard & Francis Crouch Scholastic Achievement Award: Mary Beauchamp, Gastonia

Horticultural Science

Outstanding Senior Horticulturist Award: Edward Anthony Kluttz, Durham

Microbiology

Most Outstanding Student: Neil Patrick McCrory, Raleigh

Poultry Science

T. T. Brown Poultry Science Club Award: Joseph G. Gaddy, Morven

Zoology

Zoology Senior Highest Scholastic Average: Elizabeth Fronzaglia, Cary

SCHOOL OF DESIGN

Architecture Awards

The American Institute of Architects Henry Adams Medal: Criteria: scholastic achievement, character, and promise of professional ability. Randall Smith Lanou, Santa Cruz, CA

The American Institute of Architects Henry Adams Certificate of Merit: Criteria: scholastic achievement, character, and promise of professional ability. Christopher Todd Ford, Raleigh

Richard Green Award for Design Achievement: Criteria: greatest promise in design by a Bachelor of Architecture degree recipient. Ian Sherrod Gordon, Raleigh

Architecture Faculty Award for Design Achievement: Criteria: greatest promise in design by a Bachelor of Environmental Design in Architecture degree recipient. Philip Joseph Lozier, Woodbury, NJ

Alpha Rho Chi Medal: Criteria: ability for leadership...willing service to his or her school and program...promise of real professional merit through attitude and personality. Elizabeth Anne Barnard, Durham

Golden Section Award: Criteria: appreciation for and creative application of technology in Architecture. Steven Ronald Raike, Raleigh

Academic Achievement Award: Criteria: student with the highest grade point average in the architecture program. To be determined at the end of the semester.

Technology Award: Criteria: professional level graduating student whose academic and design work best reflects an appreciation for the creative application of technology in architecture. Randall Smith Lanou, Santa Cruz, CA

Tau Sigma Delta Bronze Medal: Criteria: awarded to a School of Design graduating student in the professional or graduate programs who presents the most thought provoking thesis. To be announced

Design and Technology Awards

Art and Design

Design and Technology Faculty Book Award in Art and Design: Criteria: outstanding academic achievement in the Art and Design curriculum with highest GPA and design excellence. Jeana E. Klein, Hendersonville

Industrial Design Awards

Design and Technology Faculty Book Award in Industrial Design: Criteria: outstanding academic achievement in the Industrial Design curriculum with highest GPA and design excellence. Marie Therese Senecal, Raleigh

Design and Technology Graduate Faculty Book Award: Criteria: outstanding academic achievement in the graduate Industrial Design curriculum with the highest GPA and design excellence. Jason Christopher Billig, Yonkers, NY

Industrial Designers of America Student Merit Award: Criteria: outstanding undergraduate achievement in Industrial Design. Travis Christopher Baldwin, Wilmington

Graphic Design Awards

Graphic Design Faculty Book Awards: Criteria: academic and design excellence, contributions to the learning environment, and potential to engage the profession of graphic design by a graduate student. Paul Anthony Brock, Knoxville, TN; Pellie Sarah Lowe, Marietta, GA

Graphic Design Faculty Book Awards: Criteria: academic and design excellence, contributions to the learning environment, and potential to engage the profession of graphic design by an undergraduate student. Matthew James Checkowski, Acton, MA; Elizabeth Leigh Clawson, Beaufort

AIGA Medallion for Design Excellence: Criteria: outstanding creativity, innovation, or achievement in graphic design and visual communication...demonstration of public service or leadership on behalf of the design profession. Roy Butler Brooks, Stanfield

Landscape Architecture Awards

The American Society of Landscape Architects Certificate of Honor: Criteria: scholarship and accomplishment in skills related to the art and technology of landscape architecture. Elaine Burkel Walker, Raleigh; Michael Vaughn Holmes, Huntsville, AL

Landscape Architecture Faculty Book Award: Criteria: total scholastic performance and professional promise. Mary Gwyn Woltz, Mt. Airy

Landscape Architecture Faculty Honor Award: Criteria: outstanding academic performance and design excellence in landscape architecture. Elaine Burkel Walker, Raleigh

Landscape Architecture Faculty Service Award: Criteria: for dedicated service in support of faculty and students in the Department of Landscape Architecture. Michael Vaughn Holmes, Huntsville, AL

Meade Palmer Prize for Excellence in Planting Design: Criteria: demonstration of the highest degree of excellence in the integration of horticultural and botanical knowledge within the context of site specific design solutions. Mary Louise Musson, Ft. Wood, MO

Joseph Giovanni Roberto Disponzio Prize for Excellence in Landscape Architecture History: Criteria: achievement of the highest degree of accomplishment and sensitivity in the interpretation of historical landscape architectural precedents and their successful integration into site specific design solutions. Martha Jane Dees, Goldsboro

Harry Porter Prize for Excellence in Site Planning: Criteria: achievement of the highest degree of accomplishment and sensitivity in the integration of site planning technology and site specific design skills. Scott Christian Booger, Durham

COLLEGE OF EDUCATION AND PSYCHOLOGY

Education Council Outstanding Senior Awards:

Health Occupations Teacher Education: Vickie Lynn Strang, Chapel Hill

Marketing Education for Teacher Education: Deanna Jo Rivenbark, Wallace

Mathematics Education (high school): Michael John Clinkscales, Hertford; Shannon Marie Umberger, Mocksville

Mathematics Education (middle school): Christine Marie Floyd, Burlington

Middle Grades Language Arts and Social Studies: Amy Dofflemeyer Ehrhardt, Greensboro

Psychology (outstanding graduating senior): Meja Trienne Johnson, Dunn

Psychology (general option): Carolyn Marie Conlee, Whitinsville, MA

Psychology (human resource development option): Sara Marie Paris, Raleigh

Science Education (high school): Christina Maria Heafner, Ellenboro; Cynthia Dawn Riddle, Burnsville; Bonnie Marie Theobald, Raleigh

Science Education (middle school): George David Ward III, Fayetteville

Technology Education: Andrew Paul Schnitzer, Cary

Departmental Awards:

Durwin M. Hanson Achievement Award (Occupational Education): Jeremy Bruce Johnson, Tryon

Epsilon Pi Tau Leadership Award (Technology Education): Charlene Michelle Yount, Benson

Outstanding Teaching Assistants: Denise W. Rowell, Garner; Joe R. Busby, Raleigh

Mathematics Education Service Award to Outstanding Teacher: Kathryn G. Hill, Athens Drive High School; Joan A. Thomas, Apex High School

Psychology Department Award for Service to the Department: Michael Dale Whetzel, Capon Bridge, WV

Psychology Department Award for Academic Achievement: Shari Rolfes Yocum, Raleigh

Psychology Department Award for Research: Amy Deanne Powell, New Bern

Science Education Service Award to Outstanding Teacher: Suzanne Benjamin, Millbrook High School

Science Education Special Service Award: Dr. Charles F. Lytle, NC State University
Robert H. Hamond Outstanding Student Achievement in Graphic Communications Award:
Judd Stuart Whitehead, Charlotte

COLLEGE OF ENGINEERING

Engineering Senior Award for Scholarly Achievement: Robert M. Soule, Raleigh (Electrical and Computer Engineering)

Engineering Senior Award for Citizenship and Service: Arun Manikumar, Raleigh (Electrical and Computer Engineering)

Engineering Senior Award for Leadership: Jamie C. Byrum, Colerain (Electrical and Computer Engineering)

Engineering Senior Award for the Humanities: Heather A. Philp, Weedville, PA (Computer Science Engineering)

AEROSPACE ENGINEERING

Senior Award for Scholarly Achievement: Jason R. Zumstein, Pisgah Forest

Senior Award for Leadership: Melissa L. Cifaldi, Burnsville

Benjamin Franklin Scholar: Scott R. Starin, Lenior

United Technologies Scholarship: Jason R. Zumstein, Pisgah Forest

Senior Project Award: Angelia D. Dillingham, Asheville

BIOLOGICAL and AGRICULTURAL ENGINEERING

Agri-Life Council Outstanding Club Member Award for Biological and Agricultural Engineering Curriculum: James W. Howard, Lucama; *Technology Curriculum:* James L. Millard, Mt. Olive

CHEMICAL ENGINEERING

Benjamin Franklin Scholarship: Amanda P. Langenbach, Cary

Charles S. Mitchell Memorial Scholarship: Audrea Asdel, Rockwood, TN

Henry B. and Virginia T. Smith Scholarship: Audrea Asdel, Rockwood, TN

Sidney F. Maurey Scholarship: Christopher B. Arthur, Roanoke Rapids

Forest O. and Sandra Mixon/RTI Scholarship: Bradley P. Cozart, Mooresville

CIVIL ENGINEERING

Senior Award for Scholarly Achievement: David B. Smith, Hickory

Eisenhower Transportation Fellowship/USDOT: Michael E. Bienvenu, Cary

Associated General Contractors Outstanding Senior in Construction Award: James Richard Chandler, Greensboro

Stephen Safran/PCEA-Triangle Chapter Student Estimators Award: Wesley A. Weaver, Raleigh

Outstanding Teaching Assistants Award: David W. Parish, Fayetteville; Glen A. Malpass, Zebulon

COMPUTER SCIENCE

Scholarly Achievement: Leland J. Morrison, Youngsville

Humanities: Heather A. Philp, Raleigh

Citizenship and Service: John F. Ganaway III, Wake Forest

ELECTRICAL and COMPUTER ENGINEERING

Outstanding Electrical Engineering Senior Award: Anthony M. Jones, Raleigh

Outstanding Computer Engineering Senior Award: Erik Nystrom, Raleigh

Outstanding Electrical and Computer Engineering Senior Award: Cindy Young, Charlotte

College of Engineering Outstanding Senior Nominees: Humanities: Chad Watson, Apex; Citizenship and Service: Arun Manifumar, Raleigh; Scholarly Achievement: Robert Soule, Raleigh
Leadership: Jamie Byrum, Colerain
Faculty Senior Scholar: Jamie Byrum, Colerain

INDUSTRIAL ENGINEERING

Outstanding Senior For Scholarship in Industrial Engineering: Jaime E. Miguel, San Salvador, El Salvador
Outstanding Senior For Leadership in Industrial Engineering: John E. Stubbs, Hickory
Outstanding Senior in Furniture Manufacturing: A. Heath Patterson, Trinity

MATERIALS SCIENCE AND ENGINEERING

A. Odell Leonard Scholarship: Scott D. Burkhart, Lexington
ALCOA Foundation Scholarship: Andrew J. Darlak, Montreat; Derek Lundberg, Jamestown
NSF Engineering Research Center for Advanced Electronic Materials Processing: Research Scholar: Andrew J. Darlak, Montreat
National Honor Society of Phi Kappa Phi: Andre J. Darlak, Montreat; Mason Reed, Newport
NSF Engineering Research Center for Advanced Electronic Materials Processing Research Scholar: Daniel C. Driscoll, Cary
Society of Plastic Engineers Senior Scholarship: Daniel C. Driscoll, Cary
L. P. Doshi Scholarship: Donovan N. Leonard, Holmdel, NJ
NSF Engineering Research Center for Advanced Electronic Materials Processing Research Scholar: Derek Lundberg, Jamestown
United Technologies Inc. Scholarship: Derek Lundberg, Jamestown
Goodrum Scholarship: Mason Reed, Newport

MECHANICAL ENGINEERING

Awards To Be Announced At Departmental Ceremony

NUCLEAR ENGINEERING

Outstanding Senior Award: Charles W. Stroupe, Gastonia
Duke Power Leadership Award: Chad J. Boyer, High Point

COLLEGE OF FOREST RESOURCES

Forestry

Biltmore Forest Work Scholarship: Christa Dagley, Salisbury; Everett C. Jenkins, Washington; Christopher Manus, Marshville
James L. Goodwin Work Scholarship: James W. Dodson, Jr., Rocky Mount; Michael E. Elliott, Lansing; Charles Hines, Hillsborough; Andy "Mallie" Jenks, Apex; Jennifer L. Johnson, Kings Mountain; Ryan Keeter, Asheboro; Owen Miller, Emporia, VA; Christopher Smith, Raleigh; Boice E. Triplett, Belmont; Jeremy West, Raleigh; Heather Williams, Bennett
George K. Slocum Endowed Work Scholarship: Heather Kendall, Raleigh
John M. And Sally Blalock Beard Academic Scholarship: Jeremy S. Brinkley, Lexington; Luke Thompson, Fairview; Christopher Blanton, Kings Mountain
Ralph C. Bryant Academic Scholarship: Wesley A. Ledford, Lawndale; Robert C. McClure, West Jefferson
Edward F. Conger Academic Scholarship: Kathy Messerschmidt, Raleigh
James L. Goodwin Forestry Summer Camp Scholarships: Michael A. Berzinis, Raleigh; Jennifer L. Buzzard, Raleigh; Timothy M. Disclafani, Cary; James W. Dodson, Jr., Rocky Mount; Alexander L. Johnson, Chapel Hill; Wesley A. Ledford, Lawndale; Shannon M. Mallison, Raleigh; Jennifer R. Miller, Atlanta, GA; Matthew R. Needham, Asheboro; Leslie Newton, Raleigh; Jason A. Payne, Raleigh; Jeffrey L. Wait, Candler
R. B. And Irene Jordan Endowed Scholarship: Andrew Bailey, Cary

Jonathan Wainhouse Memorial Academic Scholarship: Charles C. McDougall, Durham; Norwood L. Webster, Kill Devil Hills

Duke Power Scholarship for Sustainable Forestry: Alexander Johnson, Chapel Hill

Hofmann Forest Academic Scholarship: Jonathan Barnes, Greensboro; Michael A. Berzins, Raleigh; Adam Braaten, Woodstock, CT; Jennifer L. Buzzard, Raleigh; Kyle Collins, Cincinnati, OH; Timothy M. Disclafani, Cary; Jason R. Flowers, Durham; Theresa L. Galinski, Raleigh; Heather D. Hargis, Clayton; Travis Hughes, Elizabeth City; John W. Shields, Candler; Terese A. Suggs, Chadbourne

Victor W. Herlevich Academic Scholarship: Nancy B. Sumners, Henderson

Maki-Gemmer-Johnson Summer Camp Academic Scholarship: Simon Rich, Raleigh

Squires Timber Company Industrial Scholarship: Matt Wimberley, Raleigh

Xi Sigma Pi Forestry Honor Society: Christina M. Almeida, Lisboa; Brian Bridgeman, Hendersonville; Jeremy S. Brinkley, Lexington; Wendee Michelle Britt, Lumberton; Darin Burns, Sanford; Jui-Chi Chen, Wheeling, IL; Lucy Ann Cromer, Raleigh; Timothy M. Disclafani, Cary; James William Dodson, Jr., Jesup, GA; David Drake, Cary; Todd Sanders Earnhardt, Swan Quarter; Valerie Suzanne Everette, Raleigh; Wilson Faquin, Wadesboro; Jeremy Chandler Ferrell, Raleigh; Theresa Lynn Galinski, Raleigh; Aaron L. Gay, Cary; Travis W. Hughes, Elizabeth City; Scott M. Hyatt, Charleston, SC; Mallie Andrew Jenks, Apex; Alexander L. Johnson, Durham; Wesley A. Ledford, Lawndale; Charles C. McDougall, Durham; Jon M. O'Brien, New London; Douglas S. Parker, Raleigh; Heather Marie Reilly, Pinehurst; Mark A. Romagosa, Raleigh; Donna Belle Scheungrab, Temple Hills, MD; Archie Corbitt Simmons, Jr., West End; Anthony Snider, Carrboro; Jeffrey L. Wait, Candler

Parks, Recreation and Tourism Management

PRTM Scholarship: David Neary Cernicek, Los Alamos, NM; Samantha Mitchell, Las Vegas, NV

Hoffman Forest Scholarship: Elisabeth Bongala, Greenville; Kristen M. Ghiloni, Raleigh; Jason N. Horner, Kernerville; Harold D. Wells, Murphy; Jeanne-Marie Bua, Wilmington; Kelly M. Curtis, Wilmington; Joseph Shimel, Wilson; David P. Sherrill, Cary

Phillip Fleming Scholarship: Laura Bryson, Asheville

Xi Sigma Pi Honor Society: Adrienne T. Bailey, Lumberton; Katherine M. Brame, Durham; Daniel Shane Brown, Charlotte; Laura A. Eddins, Raleigh; Brent Fogleman, Dunford; Brooke E. Rudd, Long Beach; Jo-Anne Scoggins, Garner; Vanessa J. Van Wyck, Henderson, NV; Harold DeWayne Wells, Murphy; Zarah Cheri Wetmore, Hickory

Thomas I. Hines Endowed Scholarship: Jennifer Zuckerman, Cary

R. B. & Irene Jordan Scholarship: Ben Herrmann, Raleigh

Wood and Paper Science

Pulp and Paper Science

ABB Scholarship: Christopher H. Alexander, Raleigh

Albany International Scholarship: Glenn Jason Martin, Harrisburg, PA

Albright & Wilson Scholarship: Nicholas Ryan Weaver, Williamston

Alonzo Aldrich Scholarship: Spencer F. Adams, Raleigh

Bill Cross Scholarship: Natalie R. Thompson, Bloomingdale, GA

Bowater/NCSU Alumni Scholarship: Jeffrey Earl Jordan, Rock Hill, SC

Brown & Root Scholarship: Jacob Bowlus, Raleigh

C. Cline Peters Scholarship: Ryan Franklin Long, Amelia Island, FL

Caraustar Industries Scholarship: Michael Scotti, Martinez, GA

Carol & Carter Fox Scholarship: Andrew Haisten Linn, Lynchburg, VA

Cascades Industries Scholarship: Terri Dorinda Lail, Hildebran

Charles N. Rogers Scholarship: Jason Thomas Persinger, Lewisburg, WVA

Charles W. Coker, Sr. Scholarship: Angela Elizabeth Hylton, Washington

CIBA Corporation Scholarship: Anthea Yen Chun Wu, Raleigh

Clariant Scholarship: Brian Wells Jones, Charlotte

Class of 1966 Scholarship: Samuel Craig Littlejohn, Columbia, SC

David Bossen Scholarship: James Jason Boyd, Lancaster, SC

Dietrich V. Asten Scholarship: Miranda Renee Martin, Rock Hill, SC

Dr. F. B. Schelhorn Scholarship: Michael A. Will, Matthews

Drs. Li-S. & Lee-F. Chang Scholarship: Cory Hal Knox, Clayton
Dwight J. Thomson Scholarship: Derrick Bernard Callander, Windsor
E. J. & Sue Brickhouse Scholarship: Elizabeth Ashley Speller, Williamston
E. J. "Woody" Rice Scholarship: William Bradley Boyette, Salisbury
EKA Scholarship: William Cephus Bragg, Rock Hill, SC
Eric Ellwood Scholarship: Travis Dustin Lail, Clyde
George E. Oakley Scholarship: Andrew Lee Weller, Washington
Harold N. Kamine Scholarship: Ryan Trigg Smith, Tappahannock, VA
Harry H. Saunders Scholarship: Kerri G. Knight Shirley, Raleigh
Hazard H. and Ada May Scholarship: Michael Brian Dowdy, Morehead City
Hercules Incorporated Scholarship: Greg Bryan Gardner, New Bern
Homer "Slick" Lusby Scholarship: Derek Roy Morris, Elkin
Hou-min Chang Scholarship: Randall Olin Pittard, Littleton
International Paper Scholarship: E. Scott Tedder, Whiteville
IP/E.E. Ellis Scholarship: George Brent Shorter, Roanoke, VA
IP/NCSS Alumni Scholarship: Cameron R. Morris, Raleigh
IP/NCSS Alumni Scholarship: Julie Matthew Tedder, Hallsboro
James M. Plette Scholarship: Jason Allen Mayberry, Goose Creek, SC
James River Foundation Scholarship: Kimberly Newman, Richmond, VA
James River Scholarship: Robert Andrew Blythe, Franklin, VA
John A. Heitmann, III Scholarship: Cynthia Camille Winston, Wake Forest
John M. Mays, Jr. Scholarship: Michael Alan Halstead, Pollocksville
John Moore Scholarship: Zachary O'Neal Guy, Canton
John R. Kennedy Scholarship: Robert James Schutte, Wilmington
JWI/Cecil Terry Scholarship: Bryan Anthony Laney, Candler
Kirk Semke Scholarship: Mary Beth Harris, Pantego
Lawrence H. Camp Scholarship: Lindsay Charlene Adkins, West Pt., VA
M. Leiby Boinest Scholarship: John E. Thompson, Windsor
Macmillan Bloedel Scholarship: William M. Ponton, Hertford
Mark J. Alexander Scholarship: Justin Rice, Midlothian, VA
Michael I. Sherman Scholarship: Christina Gay Buchanan, Spruce Pine
Nalco Chemical Scholarship: Joanna Beth Shapiro, Mechanicsville, VA
PaperChase Scholarship: Kyle Jeremy Moody, Candler
PIMA Dixie South Scholarship: Alice Marie Lyons, Bay Minette, AL
PIMA Salesmen Society Scholarship: Clint J. Kocik, Hatley, WI
PIMA-Southeast Scholarship: Jeffrey Alan Goodwin, Vale
PPF Scholarship: Christopher L. Swift, Dalton, MA
PPF Scholarship: David Carroll Franklin, Enka
PPF Scholarship: Erik Kyle Yarbrough, Linwood
PPF Scholarship: Jason Merrill Jones, New Bern
PPF Scholarship: Patricia Ann Poling, Macclesfield
PPF Scholarship: Robert McGuire Lowe, Indian Trail
PPF Scholarship: Shavoya Antwaun Underdue, Garysburg
PPF Scholarship: Stuart Moore Kaylor, New Bern
PPF Scholarship: Tiffany L. Robinson, Manson
PPF Scholarship: Tristen Paul Cheek, New Bern
PPF Scholarship: William Edgar Stallings, Concord
Procter & Gamble Scholarship: Christine Schwartz, Cary
Ray Smith Scholarship: Lanee Lauren Puckett, Silver Creek, GA
Rector/Ashcraft Scholarship: Neil Patrick Caudill, Boomer
Richard Owens Scholarship: Troy Anthony Muro, Hollidaysburg, PA
Robert Carpenter Scholarship: Chad Stafford Branch, Hopewell, VA
Robert E. Mason Scholarship: David Alan Bowen, Charlotte
Robert G. Hitchings Scholarship: Marianne Rieg, Laurinburg
Robert L. Bentley Scholarship: Ashley Lauren Smith, Frostburg, MD

Ronald Estridge Family Scholarship: William Ashley Sparks, Roanoke Rapids
Scapa Group Scholarship: Benjamin Richard Harley, Simpsonville, SC
Shouvin Family Scholarship: Elizabeth Ann Blackburn, Littleton
Sonoco/NCSCU Alumni Scholarship: Cynthia Catherine Staton, Rock Hill, SC
St. Laurent/NCSCU Alumni Scholarship: Craig William Thompson, Burgess, VA
Stone Container Scholarship: April Elise Cassano, Gloucester Pt, VA
Sture G. Olsson Scholarship: Jonathan Edward Shorter, Roanoke, VA
Sunds Defibrator Scholarship: David Arthur Council, Williamston
TAPPI/Envirochase Scholarship: Alicia Nhu Uyen Pham, Rock Hill, SC
Terry Charbonnier Scholarship: Lauren Kristen Hudson, Laurinburg
Thiele Koalin Company Scholarship: Richard Busbee Phillips, Wilmington
Tidewater Construction Scholarship: Shannon Marie Bumgarner, Hickory
Turner Family Scholarship: James Christian Samp, Mechanicsville, VA
Union Camp Scholarship: John Ashby Morgan, Suffolk, VA
Vinings Chemical Scholarship: Brian Lowell Gustin, Roswell, GA
Virginia Fibre Scholarship: Matthew Christian Quick, Arrington, VA
Weyerhaeuser Scholarship: Lynette Dawn Griffin, Williamston
Will P. Lovin Scholarship: Jonathan Mark Chipley, Asheville
William E. Caldwell Scholarship: Christopher Nelson, Sandy Ridge
William V. Cross/Nalco Scholarship: Daniel Ashby Leach, Brown Summit

Wood Products

Roy M. Carter Endowed Scholarship: Casey B. Hearn, Sanford
Thomas Forshaw, Jr. Endowed Scholarship: W. Cole Stephens, Raleigh
R. B. And Irene Jordan Endowed Scholarship: Gregory G. Lee, Roanoke Rapids; Pongpitak Wongdeethai, Chonburi, Thailand
Lilly Industries, Inc. Endowed Scholarship: Stephen M. LaFrance, Wilmington
Weyerhaeuser Company Scholarship: C. Michelle Hedgecock, Colfax; Scott A. Metheny, Raleigh
Toney Lumber Company Scholarship: James E. Bailey, Louisburg
Jerry G. Williams & Sons, Inc. Scholarship: Sampson E. Neumann, Smithfield
Lampe and Malphrus Scholarship: Karen R. Knight, Four Oaks
Coastal Lumber Company Scholarship: J. Collins Fitts, Raleigh
Wood Machinery Manufacturers of America Scholarship: Patrick J. Sweitzer, Southern Pines
Xi Sigma Pi Forestry Honor Society: Alexis R. Anderson, Hickory; James Earnest Bailey, Louisburg
Casey Bryan Hearn, Sanford; Gregory G. Lee, Roanoke Rapids; Scott A. Methany, Raleigh

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

College of Humanities and Social Sciences: Kyler Austin England, Raleigh

Department of Communication: Karen Dana MacKethan, Raleigh

Department of English: Jennifer Lynn McDade, Durham

Department of Foreign Languages and Literatures: Elizabeth Kathryn Hunt, Durham

Department of History: Chaffee William Viets, Clemmons

Division of Multidisciplinary Studies: Kyler Austin England, Raleigh

Social Work: Cheryl Christine Henschel, Chapel Hill

Department of Philosophy and Religion: Sukanya Chakrabarti, Burlington

Department of Political Science and Public Administration: Lindsay Diane McCaskill, Columbia

MD

Department of Sociology and Anthropology: Mary Catherine Pollard, Fayetteville

CHASS Council Outstanding Senior: Carrie Anne Polhamus, Durham

COLLEGE OF MANAGEMENT

High Ranking Seniors:

College of Management:

Fall 1997

Spring 1998

James Phillip Dorroll

Parul Arvind Jariwala

Department of Accounting:

Fall 1997

Spring 1998

Beth Franson Wells

Parul Arvind Jariwala

Department of Business Management:

Fall 1997

Spring 1998

James Phillip Dorroll

Amanda Susann Timmons

Department of Economics:

Fall 1997

Spring 1998

Randall Laurence Darrah

William Sutton Cherry III

COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES

College Awards to Outstanding Seniors:

Intellectual Breadth:

Scott R. Starin, Lenoir

Scholarly Achievement:

Fall 1997

Spring 1998

My-Nga Nguyen, Cary

Karen Jean Johnson Miller, Wilkesboro

John David Storey, Wake Forest

Leadership:

Fall 1997

Spring 1998

Benjamin Ross Travis, Oxford

Ann-Catherin Nordbo Simpson, Chapel Hill

Research:

Fall 1997

Spring 1998

Jennifer Lyn Netherton, Crescent City, CA

Jeremy Lee Moore, Newport

Christopher Ryan Vinroot, Charlotte

Chemistry Department

AICF-American Institute of Chemists Foundation 1998 Student Award: Juan Alphonso McKenzie, Fayetteville; Andrew Martin Dattelbaum, Cary; Hyoyoung Lee, South Korea

CRC Press Freshman Award: Jason Griffith Ho, Kinston

Merck Index Award: Hans Petter Bernhard, Raleigh; Christopher Brian Rawls, Wilmington;

Charles Sellers Nickerson, Greensboro

1998 Undergraduate Award In Analytical Chemistry: Joseph Ivan Wirgau, Clifton Park

PAMS Senior Awards: (Actual selections not yet known)

Scholarly Achievement: Emily Michelle Talton, Smithfield

Research: Kermit Timothy McElroy, Cary

Leadership: Marie Constance Linossi, Asheville

Hypercube Scholar 1997: Stephen Henry Oliver Wolfe, Jamesville

Hypercube Scholar 1998: Michael Nelson Weaver, Southern Pines

Marine, Earth & Atmospheric Sciences

Outstanding Graduating Senior in Geology: Nancy Giese, Miami, FL

Outstanding Graduating Senior in Meteorology: Robert Steenburgh, Gahanna, OH

Van Smith, Knoxville, TN

Outstanding Graduating Seniors in Marine Science: Allyson Jason, Beaufort; Edie Solomon, Cary

Outstanding Teaching Assistant Awards in Earth Science: Walter Haven, Raleigh; Rama Rani,

Raleigh

Atmospheric Science: Sharon Baker, Sanford

Marine Science: G. Todd Kellison, Raleigh

Mathematics Department

Outstanding Graduating Seniors in Mathematics: Bernard Philip Bowling IV, Durham; John David

Storey, Wake Forest; Christopher Ryan Vinroot, Charlotte

John Cell Scholarship: Dustin Frederick Kapraun, Wilmington

Mary Alice and Hubert V. Park Scholarship: Lea Angela Truman, Tar Heel; Owen John Eslinger

Burgaw

Jack Levine-Charles Anderson Award: Patrick Francis Barrow, Gastonia

Charles Anderson Scholarship: Chae Min Ko, Jamestown

Charles F. Lewis Scholarship: Not Awarded

Mrs. Roberts C. Bullock Scholarship: Robert Theodore Daland, Hillsborough

Dr. Rebecca R. Bullock Scholarship: John Wesley Cain, Greenville

Howard A. Petrea Scholarship: John David Storey, Raleigh

Carey Mumford Scholarship: Luke Robinson-Thomas Meyer, Raleigh

The Maltbie Award: Christopher Mark Lyerly, Raleigh; George William Yankosky, Reistest Town

MD

Lowell S. Winton/Nicholas J. Rose Scholarship: David Malone Chan, Caribou, ME; Tony Doungho

Choi, Greensboro

Outstanding Teaching Assistant Awards: Peter Hillel Berman, Raleigh; Kimberly Jean Drake,

Raleigh; Grant Hargett, Cary; Archimedes J. Kyrillidis, Raleigh; Seth Houston McElvaney, Raleigh;

Gerald Arthur Seaton, Raleigh; Robert Edward Wieman, Raleigh

Physics Department:

Outstanding Graduating Seniors in Physics:

Physics Leadership Award: Scott Starin, Lenoir

Physics Scholarly Achievement Award: Sukanya Chakrabarti, Durham

Physics Service Award: Nicole Morgan, Raleigh

Nancy Chung Freshman Scholarship: Joel Koerwer, Apex

1997-98 Freshman Physics Studentships: Nicholas Stoute, Jacksonville; Patrick Withem, Lenoir

PAMS Goudes Scholarship: Grant Palmquist, Raleigh

Statistics Department:

Outstanding Graduating Senior in Statistics: Haiyan (Helen) Long, Cary; Julie Elizabeth

Simmons, Ararat

F.E. McVay Scholarships: Daric Richard Harrington, Bell Mead, NJ; Audrey Michelle Rogers

Asheville; Lisa Ann Cason, Kernersville; Jason Andrew Grissom, Henderson

SAS Institute Scholarship: Brian James Copeland (Freshman), Wayne, PA; Audrey Michelle

Rogers (Sophomore), Asheville; Mark Fletcher Austin (Junior), Raleigh; Haiyan (Helen) Long (Senior),

Cary

COLLEGE OF TEXTILES

Joseph D. Moore Honor Award: Monica Elisha Morgan, Lexington
Lawrence Lason Honor Award: Joseph Lee Faulk, Sanford
Chester H. Roth Award: Laura Katherine Canup, Fayetteville
John M. Reeves Scholarship: Andrea Jamie Cox, Mt. Airy
John E. Reeves Award: Tracy Leigh Biedenbach, Raleigh
Donald F. McCullough Award: Tekesha Elaine Simmons, Fayetteville
American Association of Textile Chemists and Colorists Award: Andrea Michelle Dailey, Cary
Phi Psi Fraternity Award: Barry Dean Covert, Hudson
Kappa Tau Beta Student Leadership Award: Brian Todd Wacaster, Shelby
Delta Kappa Phi Textile Fraternity: Brian Todd Wacaster, Shelby
AAMA – Apparel Student of the Year: Stacey Lynn Cuthrell, Powells Point
Textile and Apparel Student Design Exposition: Paula Catherine-Ann Cooper, Goldsboro
Henry A. Rutherford Honorary Award: Ketan Dinanath Vaidya, Apex
Peter R. Lord Textile Engineering Design Leadership Award: Geoffrey Todd Herring, Mt. Olive
Hoechst Celanese Excellence Award for Leadership: Brian Todd Wacaster, Shelby
Hoechst Celanese Excellence Award for Academics: Michael Scott Nutt, Fuquay-Varina
Hoechst Celanese Excellence Award In Graduate Studies: To Be Announced
Graduate Alumni Fellowship: Sara Lyerly Draper, Salisbury

ALUMNI ATHLETIC AWARD

Chasity M. Melvin
Jake R. Weber

THE HONOR SOCIETY OF PHI BETA KAPPA

David Jonathan Adams
Clarence Arthur Alford
Christina Joanne Bachmann
Happi Brooke Blackwood
Brian Patrick Bobzien
Bernard Philip Bowling
Anthony Mark Brannon
Ethan Victor Brown
Jason Patrick Burton
Christy Leigh Cable
Misty Lynn Cable
John Wesley Cain
Christopher Arthur Carroll
Chukanya Chakrabarti
Elizabeth Ann Chesnut
Caryn Leigh Chisenhall
Olivia Gale Chow
Sharon Lynne Clutts
Amy Elizabeth Cook
Christina Ruth Covelli
Stacy Ann Cram
Emili Rachele Duke
Jo Anna Beth Eakin

Kyler Austin England
Sandy Ann Ersley
David Worth Frink
Elizabeth Marie Fronzaglia
Robin Jean Gonyier
David Wayne Grantham
John Zachariah Hall II
Jenny Lynn Hardison
Katherine Ruth Harrell
Kaplan Page Harris
Cheryl Christine Henschel
Leslie Diane Hickman
Danal Sue Holiday
Phil Evan Horvath
Angela Sykes Howard
Steven Edward Hughes
Dustin Frederick Kapraun
Olivia Burkett Keel
Laura Jean Kildosher
Tara Lynn Knowles
Amanda Paige Langenbach
Denard Thomas Lawrence II
Martha Frances Lee

Ya-Ling Lee
Amy Leigh Lemerman
Marie Constance Linossi
Haiyan Long
Jennifer Lea Lucas
Michael Shawn Luhrs
Karen Dana Mackethan
Michael David Madritch
Lindsay Diane McCaskill
Neil Patrick McCrory
Donald John Miller
Amber Nicole Morgan
Michael Scott Nutt
Sara Marie Paris
Dharti Arvind Patel
Jennifer Jo Peterson
Heather Angela Philp
Kristi Noelle Pierce
Katherine Poindexter
Mary Catherine Pollard
Amanda Beth Preish
Susan Kelly Pyle
Philip John Quann

Daniel James Ridge
Jonathan Charles Routh
Lynn Jamie Rubin
Jonathan Brent Scarlett
Todd Stephen Shatynski
Julie Elizabeth Simmons
Elizabeth Anne Smith
Van Stephen Smith

Kimberly Susan Snell
Scott Robin Starin
Jarnie Lynn Staup
John David Storey
Jennifer Arranaga Todhunter
Chaffee William Viets
Christopher Ryan Vinroot
Ying Di Wan

Solomon Ben-Zion Weiner
Michael Dennis Williams
Joseph Ivan Wirgau
Dara Evans Wittenberg
Jennifer Ann Woodroof
Shari Lynn Rolfes Yocum
Anna Marie Zimmermann

THE HONOR SOCIETY OF PHI KAPPA PHI

David Jonathan Adams
Lori Nicole Adams
Clarence Arthur Alford
John Anderson
Vijay Senthil Arumugam
Andrea Lyn Asdel
Christina Joanne Bachmann
Alison Elizabeth Batley
Baribrata Biswas
Happi Brooke Blackwood
Jeremy Scott Bordeaux
Bernard Philip Bowling
Virginia Cooke Boyd
Octavia Flora Brauner
Ethan Victor Brown
Timothy Wendell Buie
Karen Elizabeth Burlone
Jason Patrick Burton
Jamie Carol Byrum
Christy Leigh Cable
Misty Lynn Cable
John Wesley Cain
Jennifer Roberts Carnes
Sukanya Chakrabarti
Catherine Preston Chandler
Elizabeth Ann Chesnut
Johanna Briggs Clark
Amy Elizabeth Cook
Laurin Hayworth Cooke
Christina Ruth Covelli
Bradley Parks Cozart
Stacy Ann Cram
Anthony Scott Creech
Andrew John Darlak
Christopher Lee Daum
Cristina Davidson
Jennifer Paige Deans
Jennifer Jo Deihl
Sara Lyerly Draper
Jo Anna Beth Eakin

Amy Dofflemoyer Ehrhardt
Edward Travis Elrod
Kyler Austin England
Barry Allen Evans
Christopher Todd Ford
Heidi Harper Friedlein
David Worth Frink
Joseph Steele Gardner
Katherine Ann Garner
Robin Jean Gonyier
Jeremy Philip Goodwin
David Wayne Grantham
Donna Gayle Greene
Renee Lynn Greenlee
James Robert Guettler
John Zachariah Hall II
Karen Renae Hall
Alice Medford Hancock
Steven Arthur Handlos
Jenny Lynn Hardison
Katherine Ruth Harrell
Leslie Diane Hickman
Danal Sue Holiday
Jamie Page Hunter
Paul Joseph Ilecki
Michael Allen Jeffris
Robert Howard Jenkins
Jacob Alexander Johnson
Jeffery Allan Johnson
Anthony Mark Jones
Dustin Frederick Kapraun
Olivia Burkett Keel
Laura Jean Kildosher
Jeana Eve Klein
Deborah Joyce Kramer
Jennifer Lee Kreimer
Kristine Josephine Lang
Elizabeth Blackwell Laundon
Denard Thomas Lawrence II
Anthony Vincent Lebude

Amy Leigh Lemerman
Travis Shea Lentz
Julie Lam Lew
Marie Constance Linossi
Haiyan Long
Daniel Hopkins Loughlin
Michael Shawn Luhrs
Karen Dana Mackethan
Michael David Madritch
Arun Manikumar
Melva Jule Mansfield
Caroline Rebecca Martin
Angela Marie Mason
Joseph Adam May
Lindsay Diane McCaskill
Neil Patrick McCrory
Amanda Lee McKee
Nicola Joanne Melliari-Smith
Luke Robinson Thomas Meyer
Jaime Eduardo Miguel Siman
Kathleen Elizabeth Moell
Amber Nicole Morgan
Sherwin Craig Murphy
Gajanan Suresh Natu
Glenda Allen Noble
Christine Pilla Nocito
Cheryl Cheves Noe
Steven Jon Novick
Michael Scott Nutt
Erik Matthew Nystrom
Tony Michael O'Driscoll
Lea Grace Osborne
Dharmapriya Ramanlal Patel
Elizabeth Ann Pattillo
Jennifer Jo Peterson
Gilchrist Smoot Phillips
Heather Angela Philp
Kristi Noelle Pierce
Catherine Shepherd Pitts
Mary Catherine Pollard

Amanda Beth Preish
Susan Kelly Pyle
Carolyn Elizabeth Rendall
Michael Donald Rhodes
Cynthia Dawn Riddle
Stacy Kay Robinson
Jody Lynn Roubanis
Jonathan Charles Routh
Lynn Jamie Rubin
Gaynelle Rummage
Janine Sagris

Michael Harrison Scott
Todd Stephen Shatynski
Julie Elizabeth Simmons
David Brandon Smith
Elizabeth Anne Smith
Matthew Avery Smith
Hanijanto Soewandi
Robert Marion Soule III
Scott Robin Starin
Vickie Lynn Strang
Ruth Ellen Swartz

Rosemary Claire Thompson
Karen Kristine Tysinger
Chaffee William Viets
Anita Branch Walton
Ying Di Wan
Yung-Hwa Eva Wang
Lori Kay White
Judd Stuart Whitehead
Yen Chun Wu
Cindy Karen Young
Anna Marie Zimmermann

PHI KAPPA PHI ACHIEVEMENT AWARDS

(4.0 and 100 NC State University Hours)

Jamie C. Byrum
Kyler A. England
David W. Grantham
Parul A. Jariwala
Anthony M. Jones
Johnnie Moultrie

Dharti Patel
Lynn J. Rubin
David B. Smith
Robert Soule
Emily M. Talton

NATIONAL PHI KAPPA PHI FELLOWSHIP

Nominee: Christopher R. Vinroot
Honorable Mention: Michael S. Nutt
Honorable Mention: Susan K. Pyle

GOLDEN CHAIN HONOR SOCIETY SENIORS

Alison Elizabeth Batley
Jeremy Scott Bordeaux
David W. Frink
Danielle Kara Greco

David Royden Higgins
Abee Christian Lowman
Emily Nolan O'Quinn
Susan Kelly Pyle

Kyle Jason Rehder
Todd S. Shatynski

ARMY ROTC COMMISSIONEES

DECEMBER 1997

Timothy E. Duggan	Buffalo, NY
Brent D. Fogelman	Raleigh
Denis J. Gulakowski	Burke, VA
Steven D. Howard	Martinsville, VA
Mark D. Sheets	Mocksville

MAY 1998

William S. Carter	Mt. Olive
Eric B. Dennis	Albermarle
Jason R. Graves	Greensboro
Jason S. MacKenzie	Pittsburgh, PA
John R. Mann	Rochester, NY
Jason B. Nicholson	Fayetteville
Stanley K. Redmond	Lewisville
Christopher E. Smith	Hickory
Anthony R. Thacher	Raleigh
Jennifer A. Woodroof	Raleigh

NAVY/ MARINE CORPS COMMISSIONEES

DECEMBER 1997

David W. Anderson	Climax
Jesse L. Boyd, Jr	Belle Chasse, LA
Preston S. Heartley	Newport
Brian K. Mabry	Norwood
Antonio Scurlock	Chapel Hill

MAY 1998

David S. Bough	Knoxville, TN
Derek S. Brady	Louisville, KY
Quincy A. Byrd	Raleigh
Douglas A. Cook	Orlando, FL
Johnnie D. Jones, Jr	Vacaville, CA
Trevor W. Laurie	Smithfield
Michael A. Little	Mexico, MO
Ryan S. McCulloch	Charlotte
Paul C. Teachey	Clayton

AIR FORCE ROTC COMMISSIONEES

DECEMBER 1997

Tonya M. Criego	New Bern
John C. McClurg	Fayetteville
Timothy P. Morris	Charlotte
J.C. Strickland, Jr.	Rocky Mount
Kristin M. Wilkinson	Midlothian, VA
Heather R. Wyss	Waxhaw

MAY 1998

Bruce Cruz	Lumber Bridge
Mike J. Dawson	Germantown, MD
John F. Delahanty	Cary
Jimmy N. Griffin, III	Fayetteville
Andrew S. Hoyle	Dallas, TX
Eric Lindquist	Carmel, NY
Kevin C. Merritt	Fayetteville
Gary W. Moore	Clarksburg, WV
Todd H. Shugart	Fayetteville
Lesley M. Smith	Lumber Bridge
Brian E. Tellmon	Poughkeepsie, NY
Steven K. Shearin	Raleigh
Chad A. Watson	Ft Lauderdale, FL

1998 GRADUATION ACKNOWLEDGEMENTS

The following non-University organizations have contributed significantly to the success of our graduation exercises.

**Design and Implementation
of Stage Backdrop:**

**Mr. Frank Greathouse, Owner
Realizations, Inc., Wilmington, NC**

Sound Systems:

**Mr. Wade C. Miller, Jr., Owner
Sound Engineering, Greensboro, NC**

Floral Designs:

**Johnson-Paschal Floral Co., Inc.
Raleigh, NC**



Agricultural Institute

*College of Agriculture and
Life Sciences*

Thirty-eighth Commencement



*North Carolina State University
Raleigh, North Carolina*

*Stewart Theatre
May 15, 1998*

AGRICULTURAL INSTITUTE COMMENCEMENT EXERCISES

May 15, 1998

3:00 p.m.

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

NORTH CAROLINA STATE UNIVERSITY

James L. Oblinger, Dean

Presiding

PROCESSIONAL

*INVOCATION Dr. David Hailey
Pastor, Hayes Barton Baptist Church
Raleigh, North Carolina

ADDRESS William Bobbitt "Bob" Jenkins
President
North Carolina Farm Bureau Federation

AWARDING OF DIPLOMAS Dean James L. Oblinger

George T. Barthalmus
Interim Associate Dean and Director
Academic Programs

Dr. John C. Cornwell
Assistant Director of Academic Programs and
Director of the Agricultural Institute

CONFERRING OF DEGREES Chancellor Larry K. Monteith
North Carolina State University

MOVING OF THE TASSELS Class Valedictorians

REMARKS Chancellor Larry K. Monteith

STUDENT COMMENCEMENT SPEAKER Cynthia Denise Eudy

FINAL REMARKS Dean James L. Oblinger

* BENEDICTION Dr. David Hailey

*RECESSIONAL

Reception Immediately Following the Commencement Exercises.

*Please Stand.

AGRICULTURAL INSTITUTE

GRADUATES

May 15, 1998

ASSOCIATE IN APPLIED SCIENCE IN AGRIBUSINESS MANAGEMENT

December, 1997

	John David Batts	Rocky Mount
† H	Toni M. Bennett	Swansboro
H	David Bradley Benton	Ronda
	Steven Michael Burge	Evergreen
†	Trent Andrew Colburn	Swansboro
† HH	Michael Aron Cox	Monroe
	Dan Everett Odom, III	St. Pauls
	Marvin O'Hara Powell	Hamlet
†	James Allison Sharp	Sims
†	Joseph Brandon Sutton	Mocksville
	Eric Bruce Tew	Dunn

May, 1998

HH	Cynthia Denise Eudy	Concord
H	Wesley Alan Foster	Mocksville
†	Paul Solomon Gibbs	Knightdale
†	Ryan Michael Hagerman	York, PA
† HH	John Kerr Hubbard, IV	Fayetteville
	Brian Keith Johnson	Benson
H	Jarold Roy Justice	Henderson
†	David Lewis Matthews	Turkey
H	Jerry Davis Rose, Jr.	Courtland
†	Thomas Bradley West	Fremont

ASSOCIATE IN APPLIED SCIENCE IN AGRICULTURAL PEST CONTROL

December, 1997

H †	Toni M. Bennett	Swansboro
†	Christopher Earl Gay	Rocky Mount
‡	Chad Mac Hayes	Evergreen

May, 1998

	Paul Solomon Gibbs	Knightdale
--	--------------------	------------

ASSOCIATE IN APPLIED SCIENCE IN FIELD CROPS TECHNOLOGY

December, 1997

†	Christopher Earl Gay	Rocky Mount
H	Donald Glenn Godwin	Tarboro
	Joseph Brent Leggett	Spring Hope
	Johnathan Edward Morris	Rich Square
H	Edward Arnold Radford, Jr.	Mt. Airy

May, 1998

† HH	John Kerr Hubbard, IV	Fayetteville
	William Warner Hudgins	Eure
†	Samuel Eugene Locklear	Matthews
	Joseph Kent Revels, Jr.	Fuquay-Varina
	Aaron Fisher Stack	Laurinburg
†	Thomas Bradley West	Fremont

ASSOCIATE IN APPLIED SCIENCE IN FOOD PROCESSING, DISTRIBUTION AND SERVICE

May, 1998

H	Brian Scott Johnson	Benson
HH	Ammar Yacoub Natsheh	Knightdale
	Myron Adarell Taylor	Battleboro

ASSOCIATE IN APPLIED SCIENCE IN GENERAL AGRICULTURE

December, 1997

†	Michael Langley Davis	Rowland
† ‡ HH	William Bradley Hargett	Monroe
H	Daniel Franklin Kornegay, III	Princeton
†	Dan Everett Odom, III	St. Pauls
†	James Allison Sharp	Sims
†	Joseph Brandon Sutton	Mocksville

May, 1998

H	Joshua James Billock	Murphy
†	Ryan Michael Hagerman	York, PA
† ‡ H	Edward Arnold Radford, Jr.	Mount Airy

ASSOCIATE IN APPLIED SCIENCE IN LIVESTOCK MANAGEMENT AND TECHNOLOGY General Livestock Option

December, 1997

† HH	Michael Aron Cox	Monroe
†	Michael Langley Davis	Rowland
† HH	William Bradley Hargett	Monroe

May, 1998

† H	Jeffrey Keith Cook	Jonesville
† ‡ H	John William Jackson Headen	Siler City
†	John Wallace Hobbs, III	Hertford
†	Samuel Eugene Locklear	Matthews
† ‡ H	Sean Ephraim Parnell	Bladenboro
	Bryan Harman Phillips	Wadesboro
† ‡ H	Edward Arnold Radford, Jr.	Mount Airy
‡	Darrell Stanley Ragan	Sanford
†	Casey Darold Richardson	Statesville
† HH	Joseph Brown Wachs	Siler City
‡	Benjamin Ashley Weathers, IV	Wendell
†	Thomas Bradley West	Fremont
‡	Charles Craig White, II	Henderson

ASSOCIATE IN APPLIED SCIENCE IN LIVESTOCK MANAGEMENT AND TECHNOLOGY

Poultry Option

December, 1997

† HH	Michael Aron Cox	Monroe
†	Tim Paul Woodrow Lanier	Jacksonville
	Charles Kevin Long	Monroe

May, 1998

H	Jeremiah Luke Beatty	Statesville
† ‡ H	Rolanda Rose Cavanaugh	Wallace
† H	Jeffrey Keith Cook	Jonesville
† H	Christopher Brad Gee	Siler City
	David Earl Greer	Pink Hill
	Charles Daniel Jarmon	Holly Springs
†	David Lewis Matthews	Turkey
† ‡ H	Sean Ephraim Parnell	Bladenboro
† HH	Jason Carlisle Rhodes	Kings Mountain
	Richard Mattoc Sessoms	Roseboro
† HH	Joseph Brown Wach\$	Siler City

ASSOCIATE IN APPLIED SCIENCE IN LIVESTOCK MANAGEMENT AND TECHNOLOGY

Swine Option

December, 1997

† HH	Michael Aron Cox	Monroe
†	Michael Langley Davis	Rowland
†	Tim Paul Woodrow Lanier	Jacksonville

May, 1998

† ‡ H	Rolanda Rose Cavanaugh	Wallace
† H	Jeffrey Keith Cook	Jonesville
†	Christopher Brad Gee	Siler City
† ‡ H	John William Jackson Headen	Siler City
†	John Wallace Hobbs, III	Hertford
†	Samuel Eugene Locklear	Matthews
†	David Lewis Matthews	Turkey
‡	Adam Trent McLanb	Roseboro
	Christopher Andre Melvin	Roseboro
† HH	Jason Carlisle Rhodes	Kings Mountain
†	Casey Darold Richardson	Statesville
†	Thomas Bradley West	Fremont
	Walter Luther Williams	Rose Hill

ASSOCIATE IN APPLIED SCIENCE IN ORNAMENTALS AND LANDSCAPE TECHNOLOGY

December, 1997

	<i>Fredrick Lee Bruton</i>	<i>Wilson</i>
†	<i>Trent Andrew Colburn</i>	<i>Swansboro</i>
	<i>Brian Heath Craven</i>	<i>Asheboro</i>
	<i>John Scott Cuthbertson</i>	<i>Monroe</i>
HH	<i>George Worrell Fields</i>	<i>Raleigh</i>
HH	<i>Virginia Marie Kuehler</i>	<i>Raleigh</i>
† ‡ H	<i>Simeon Bruce McIver</i>	<i>Holly Springs</i>

May, 1998

	<i>Cory Ryan Baucom</i>	<i>Charlotte</i>
	<i>Jacob Ross Cashion</i>	<i>Lexinton</i>
	<i>Jacob Daniel Evaul</i>	<i>Newland</i>
†	<i>Ryan Michael Hagerman</i>	<i>York, PA</i>
H	<i>James Matthew Horney</i>	<i>Newland</i>
	<i>William Albert Jinnette</i>	<i>Goldsboro</i>
	<i>Stephen Coleman Mann</i>	<i>Raleigh</i>
HH	<i>David Tuckwiller Miller</i>	<i>Boone</i>
†	<i>Matthew Paul Newsome</i>	<i>Elon College</i>
	<i>Edward Alton Owens</i>	<i>Reidsville</i>
	<i>Jason Bradley Pope</i>	<i>Kenly</i>
†	<i>Jackson Wendell Strickland, III</i>	<i>Louisburg</i>
† HH	<i>James William Sullivan</i>	<i>Lakeview, NY</i>
‡	<i>Anna Grae Trivett</i>	<i>Crossnore</i>
HH	<i>Richard Alton Wooten</i>	<i>Chapel Hill</i>

ASSOCIATE IN APPLIED SCIENCE IN TURFGRASS MANAGMENT

December, 1997

HH	<i>Robert Paul Anderson</i>	<i>Raleigh</i>
HH	<i>Matthew Aaron Boyd</i>	<i>Greenville</i>
HH	<i>Christopher M. Conners</i>	<i>Rougemont</i>
	<i>David J. Dekker</i>	<i>Chapel Hill</i>
‡	<i>Joseph Michael DuBois</i>	<i>Raleigh</i>
	<i>Joshua Eric Duckworth</i>	<i>Oxford</i>
H	<i>Donald Anthony Holt</i>	<i>Raleigh</i>
H	<i>Stephen Scott Jackson</i>	<i>Red Springs</i>
	<i>Craig Alan Kachline</i>	<i>S. Euclid, Ohio</i>
	<i>H Keith Marlow Lindquist</i>	<i>Raleigh</i>
† ‡ H	<i>Simeon Bruce McIver</i>	<i>Holly Springs</i>
HH	<i>Jeffrey Brian Minor</i>	<i>Gibsonville</i>

Darden Robert Nicks *Chapel Hill*
 H *Jeffrey David Noser* *Raleigh*
Jesse Bryan Patrick *Sneadsferry*
 H *William Clay Rigdon* *Raleigh*
 HH *Richard A. Wooten* *Raleigh*

May, 1998

John Adams Alabaster *Fayetteville*
 H *Paul Antony Bowsman* *Asheville*
 HH *Carl James Boxberger* *Durham*
Chad Michael Buchman *Raleigh*
 ‡ HH *Nathaniel Bradley Cline* *Taylorsville*
 ‡ *Robert Chevis Cuthrell* *Mocksville*
Geoffrey Charles Dail *Greensboro*
 † *Ryan Michael Hagerman* *York, PA*
Joseph Brent Hardin *Waynesville*
 H *Brian Steven Hicks* *Troy*
 ‡ *William Howard Hobgood* *Henderson*
Jason Weldon Kennedy *Timberlake*
 ‡ HH *David Michael Letterman II* *Burnsville*
Brian Franklin Main *Raleigh*
 HH *Thomas Chad Mullis* *Monroe*
 † *Matthew Paul Newsome* *Elon College*
Jonathan Mark Nixon *Tyner*
Daniel Lee Rich *Greensboro*
Christopher Alan Stanley *Ashe County*
 ‡ *Thomas Gordon Stegall* *Lexington*
 † *Jackson Wendell Strickland, III* *Louisburg*
 † HH *James William Sullivan* *Lakeview, NY*
James Lee Wilson *Ahoskie*

† Co-Major

‡ Agribusiness Concentration

H Honors

HH High Honors

Academic Honors

Students with a grade point average of 3.00-3.49 graduate with Honors. Students with a grade point average of 3.50-4.00 graduate with High Honors

Academic Costume

Academic gowns represent a tradition handed down from the universities of the Middle Ages. These institutions were founded by the Church; the students, being clerics, were obliged to wear the prescribed gowns at all times. Round caps later became square mortarboards; the hoods, originally cowls attached to the gowns, could be slipped over the head for warmth.

Many European universities have distinctive caps and gowns which are different from those commonly used in this country. Some of the gowns are of bright colors and some are embellished with fur. A number of these may be noted in the procession.

The usual color for academic gowns in the United States is black. The bachelor's gown is worn closed, the master's and doctor's may be worn open or closed. The shape of the sleeve is the distinguishing mark of the gown: bachelor--long pointed sleeves; master--oblong, square cut in the back with an arc away in front; doctor--bell shaped.

Caps are black. The tassels for the Ph.D. degree are gold and those for other graduate and professional degrees may be of the color corresponding to the trimmings on the hoods. The color of the tassels for bachelor's degrees indicates the curriculum of the graduate: Agriculture, maize; Design, brown; Education, light blue; Engineering, orange; Forest Resource, russet; Liberal Arts, white; Physical and Mathematical Sciences, yellow; Textiles, wine red.

Of all the components of the academic costume, the hood bears the heaviest symbolic burden. The hood must make clear the level of the degree, the faculty in which it was given, and the institution which awarded it. The level of the degree is shown by the size of the hood, the width of the velvet trimmings, and in the case of doctors, by the shape. The bachelor's, master's, and doctor's hoods are three feet, three and one-half feet, and four feet long respectively. The velvet trimming in the same order is two, three, and five inches and extends all around the hood on the exposed edge. This same trimming identifies the faculty. A partial list of the colors follows: Agriculture, maize; Architecture and Art, brown; Science, golden yellow; Economics, copper; Education, light blue; Engineering, orange; Forestry, russet; Physical Education, sage green; Religion, scarlet; Speech, silver gray; Veterinary Medicine, gray; Textiles, wine red. The following faculties have the same color--dark blue: Anthropology, History, Languages, Literature, Philosophy, Political Science, Sociology.



1998 Fall Graduation Exercises

North Carolina State University



Wednesday, December 16
Nineteen Hundred and Ninety-Eight

DEGREES TO BE CONFERRED

Wednesday, December 16
Nineteen Hundred and Ninety-Eight

This program is prepared for informational purposes only. The appearance of an individual's name does not constitute the University's acknowledgement, certification, or representation that the individual has fulfilled the requirements for a degree.

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CHANCELLOR MARYE ANNE FOX



Chancellor Marye Anne Fox, a chemist and member of the National Academy of Sciences, is North Carolina State University's 12th chief executive officer. Appointed on April 9, Fox assumed the duties of the top post at the state's leading science, engineering and technology university on August 1.

Before assuming duties here, Fox was the M. June and J. Virgil Waggoner Regents Chair in Chemistry and vice president for research at the University of Texas at Austin. In the latter capacity, she was responsible for administrative support of research on and off campus. The portfolio, which included \$246 million in sponsored research in 1996-1997, extended over a broad range of departments and interdisciplinary units.

Fox was born in Canton, Ohio, in 1947 and received her bachelor of science degree from Notre Dame College and her doctorate from Dartmouth College, both in chemistry. After a postdoctoral appointment at the University of Maryland, she joined the faculty at the University of Texas at Austin in 1976.

At UT, she taught chemistry courses at both undergraduate and graduate levels and was named by *Utmost Magazine* as one of the "Best of UT Natural Science Faculty" and in 1986 won the College's Teaching Excellence Award. In 1996, she won Sigma Xi's Monie A. Ferst Award for outstanding mentoring.

Nationally, she has served as co-chair of the National Science Foundation/National Science Board Task Force on Graduate Education and chairs the National Research Council Committee on Undergraduate Science Education.

Fox is one of the nation's most creative and prolific physical organic chemists, having published more than 300 refereed papers, five books and more than 20 book chapters, mostly in organic photochemistry and electrochemistry. She has been elected to membership in the National Academy of Sciences and the American Philosophical Society, and as a fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science. She has received numerous awards and honors for her contributions to research and teaching.

Fox, the mother of three sons and two stepsons, is married to Dr. James Whitesell, a noted chemist who has joined the NC State faculty as a professor of chemistry.

Musical Program

EXERCISES OF GRADUATION

December 16, 1998

British Brass Band Concert 8:30 a.m.

Procession of the Nobles Nicolai Rimsky-Korsakov
arranged by James Curnow

Ave Verum Wolfgang A. Mozart
arranged by Brigadier A.H. Jakeway

A Malvern Suite Philip Sparke
Worcester Cathedral
The Wye at Hereford
Gloucester Market

Divertimento Brian Kelly
Prelude
March
Intermezzo
Scherzo

PROCESSIONAL: 9:00 a.m.

Ceremonial March Robert B. Petters

RECESSIONAL (Platform Party Only)

Ceremonial March Robert B. Petters

NORTH CAROLINA STATE UNIVERSITY
BRITISH BRASS BAND
Dr. Robert B. Petters, Director

Exercises of Graduation

Reynolds Coliseum
Chancellor Marye Anne Fox
Presiding

December 16, 1998

PROCESSIONAL, 9:00 a.m. Dr. Robert B. Petters
Director, North Carolina State University British Brass Band.
The audience is requested to remain seated during the Processional

WELCOME Chancellor Marye Anne Fox

INVOCATION The Reverend Nancy Petty
Pullen Memorial Baptist Church

NATIONAL ANTHEM The Grains of Time

INTRODUCTIONS Chancellor Fox

ADDRESS Mr. Benjamin S. Ruffin
Chairman of the Board of Governors

CONFERRING OF HONORARY DEGREES Chancellor Fox

Dr. Nicolaas Bloembergen
Dr. Joab Langston Thomas

Doctor of Sciences
Doctor of Humane Letters

CONFERRING OF DEGREES Chancellor Fox
Candidates for advanced degrees presented by Dean of Graduate School. Candidates for baccalaureate degrees presented by Deans of Colleges/Schools.

ADDRESS TO FELLOW GRADUATES Mr. Bernel E. Hall, Jr.
Class of 1998

RECOGNITIONS Chancellor Fox

VALEDICTORIANS CLASS OF 1998

Johnnie Lewis Moultrie

Loreta V. Wilson

TURNING OF THE TASSEL Mr. Bernel E. Hall, Jr.

ALMA MATER The Grains of Time

RECESSIONAL (Platform Party only)

MR. BENJAMIN S. RUFFIN



Benjamin S. Ruffin is chairman of The University of North Carolina Board of Governors and vice president for corporate affairs at R.J. Reynolds Tobacco Co. in Winston-Salem.

He was elected in July 1998 to a two-year term as head of the University system's policy-making body after serving as vice chairman. He has been a member of the Board of Governors since 1991.

In his corporate role, Ruffin is responsible for leading the R.J. Reynolds Tobacco Co.'s local, state and national partnerships with key minority business, civic and professional organizations. He joined the company in 1989. Ruffin serves as chairman of the corporate roundtable of the National Black Caucus of State Legislators and is on the boards of the Congressional Black Caucus Foundation and the National Urban League.

A native of Durham, Ruffin earned a bachelor's degree in education from North Carolina Central University and a master's degree in social work from UNC-Chapel Hill. A civil rights activist in the 1960s, Ruffin later served as special assistant to North Carolina Governor James Hunt and was responsible for increasing the number of black judges in the state and expanding the number of blacks employed in state government.

His community involvement includes serving as chairman of the N.C. Institute for Minority Economic Development and on the 1998 Winston-Salem United Way Capital Campaign Steering Committee. He is a life member and a Golden Heritage member of the NAACP. Ruffin has earned numerous awards for his civic leadership, including the 1991 NAACP Kelly M. Alexander Award and the McGannon Citation by the National Urban League. He also holds a number of honorary degrees.

Ruffin and his wife, Avon, reside in Lewisville, and have two daughters, April and Benita.

The Alma Mater

Words by:

ALVIN M. FOUNTAIN, '23

Music by:

BONNIE F. NORRIS, JR., '23

Where the winds of Dixie softly blow
o'er the fields of Caroline,

There stands ever cherished N.C. State,
as thy honored shrine.

So lift your voices; Loudly sing
from hill to oceanside!

Our hearts ever hold you, N.C. State
in the folds of our love and pride.

DR. NICOLAAS BLOEMBERGEN



Dr. Nicolaas Bloembergen is an internationally acclaimed physicist whose honors include the 1981 Nobel Prize for Physics and the 1974 National Medal of Science.

Bloembergen is Gerhard Gade University Professor Emeritus at Harvard University, where he earned his doctorate in physics in 1951. A native of the Netherlands, Bloembergen earned degrees from the University of Utrecht and the University of Leiden before coming to the United States to study. He became a naturalized citizen in 1958.

Bloembergen shared the Nobel Prize in Physics with A.L. Schawlow for their contributions to the development of laser spectroscopy, and with K. Siegbahn for his contribution to the development of high resolution electron spectroscopy. Bloembergen's National Medal of Science cited his pioneering applications of magnetic resonance to the study of condensed matter. He won the Alexander von Humbolt Senior U.S. Scientist Award in 1980 and 1987, and the Alexander von Humbolt Medal in 1989. His 1983 IEEE Medal of Honor recognized his "pioneering contributions to quantum electronics, including the invention of the three-level solid state maser."

His research has included nuclear and electronic magnetic resonance, solid state masers and lasers, and especially nonlinear optics and spectroscopy. His work with colleagues in developing a rigorous theory of nonlinear polarizability led to the extension of the laws of reflection and refraction.

Bloembergen has published more than 300 papers in various scientific journals and is the author of two major monographs.

In addition to his service on the faculty of Arts and Sciences at Harvard University for more than four decades, Bloembergen also was a visiting professor in Berkeley and Pasadena as well as in Paris, Leiden, Bangalore and Munich. He is a member of numerous academies in the United States and abroad, and has served on dozens of U.S. government, industry and academic advisory committees.

He holds honorary degrees from Harvard University, Laval University, Moscow State University, Hartford University, the University of Central Florida, the University of Massachusetts-Lowell, and the University of Connecticut.

DR. JOAB LANGSTON THOMAS



Dr. Joab Langston Thomas has had a distinguished career in higher education, having served as chief executive officer of three major U.S. universities, including North Carolina State University.

Thomas earned his bachelor's, master's and doctoral degrees in biological science from Harvard University, where in 1955 he launched his academic career in teaching and research. He returned to his native Alabama in 1961 to join the biology faculty at the University of Alabama, subsequently rising through the ranks to become vice president for student affairs.

In 1976, Thomas became NC State's ninth chancellor. Under his leadership from 1976 to 1981, NC State increased student enrollment and faculty numbers. He is credited with establishing the John T. Caldwell Merit Scholarship program, making significant facilities' improvements, and developing a number of institutes, centers and foundations.

Thomas' tenure featured a strong commitment to the humanities at a university acclaimed for its strengths in science, engineering and technology. He established the College of Humanities and Social Sciences' Extension program -- the first of its kind in the country. While he was chancellor, ground was broken for the construction of NC State's College of Veterinary Medicine.

Following his NC State days, Thomas served as president of the University of Alabama and of The Pennsylvania State University. Since his 1995 retirement, Thomas and his wife, Marly, have resided in Tuscaloosa, Alabama.

During his career, he actively served in major education organizations and working committees, such as the American Association of State Colleges and Universities; the Association of American Universities and its Task Force on International Studies; and the Big 10 Conference and its Planning Committee and Council of Presidents.

He is a member of numerous professional associations, has served on countless prestigious corporate and nonprofit boards of directors, and has received scores of honors and awards. He holds honorary degrees from the University of Alabama, Stillman College and Tri-State University.

Time and Location for College and Departmental Ceremonies

College of Agriculture and Life Sciences - 11:30 a.m.

Agricultural Business Management	225 Nelson Hall
Agricultural and Extension Education	University Club, 4200 Hillsborough Street
Agronomy, Crop, and Soil Science	2215 Williams Hall
Animal Science	McKimmon Center, Western Boulevard
Biochemistry	1404 Williams Hall
Biological and Agricultural Engineering	158 Weaver Laboratories
Biological Sciences	2722 Bostian Hall

Biological Sciences Major	Microbiology
Botany	Plant Pathology
Ecology	Toxicology
Entomology	
Genetics	

Environmental Sciences	Location of Major Faculty Advisor
Food Science and Nutrition	105 Schaub Hall
Horticultural Science	159 Kilgore Hall
Natural Resources	Location of Major Faculty Advisor
Physiology Program	Location of Major Faculty Advisor
Poultry Science	106 Scott Hall
Applied Sociology	218 Withers Hall
Zoology	3712 Bostian Hall

Fisheries and Wildlife Sciences
Medical Technology
Zoology Majors

School of Design - 3:00 p.m. Stewart Theatre, Talley Student Center
Coffee & Dessert - 12:30 p.m. - 2:00 p.m. Brooks Hall Gallery

College of Education and Psychology - 11:30 a.m. McKimmon Center,
Western Boulevard

College of Engineering - 11:30 a.m.

Aerospace Engineering	Cinema, Witherspoon Student Center
Biological and Agricultural Engineering	158 Weaver Laboratories
Chemical Engineering	242 Riddick Laboratories
Civil Engineering	240 Nelson Hall Auditorium
Computer Science	Pullen Memorial Baptist Church, 1801 Hillsborough Street
Electrical and Computer Engineering	Stewart Theatre, Talley Student Center
Industrial Engineering	Ephesus Baptist Church, 6767 Hillsborough Street

Integrated Manufacturing Systems Engineering	136 Engineering Graduate Research Center, Centennial Campus
Master of Engineering	136 Engineering Graduate Research Center, Centennial Campus
Materials Science and Engineering	234 Riddick Laboratories
Mechanical Engineering	Cinema, Witherspoon Student Center
Nuclear Engineering	1202 Burlington Laboratories

College of Forest Resources - 11:30 a.m. . McKimmon Center, Western Boulevard

College of Humanities and Social Sciences - 11:30 a.m. except for one marked with
an asterisk

Communication	The Raleigh Convention & Conference Center Complex
English	West Raleigh Presbyterian Church, 27 Horne Street
Foreign Languages and Literatures	3118 Talley Student Center
History	107 Harrelson Hall
*Multidisciplinary Studies - 1:30	West Raleigh Presbyterian Church, 27 Horne Street
Philosophy and Religion	3118 Talley Student Center
Political Science and Public Administration	216 Poe Hall
Social Work	G107 Caldwell Hall
Sociology and Anthropology	218 Withers Hall

College of Management - 11:30 a.m.

Accounting	Reynolds Coliseum
Business Management	Reynolds Coliseum
Economics	Reynolds Coliseum

College of Physical and Mathematical Sciences - 11:30 a.m.

Chemistry	124 Dabney Hall
Marine, Earth and Atmospheric Sciences	2010 Biltmore Hall
Mathematics	207 Harrelson Hall
Physics	206 Cox Hall
Statistics	Brownstone Hotel, 1707 Hillsborough Street

College of Textiles - 11:30 a.m. W. Duke Kimbrell Atrium,
Centennial Textiles Complex

Reception - Immediately following departmental ceremony. . . . Convocation Center,
Centennial Textiles Complex

ROTC COMMISSIONING CEREMONY

Colonel Robert L. Ostrander, Jr.
Presiding

Talley Student Center Ballroom
16 December 1998

PROCESSIONAL MARCH, 4:15 p.m Dr. Robert B. Petters
Director, North Carolina State University British Brass Band

POSTING OF THE COLORS Multi-Service Color Guard

NATIONAL ANTHEM

INVOCATION Chaplain Helton

WELCOME Dr. Marye Anne Fox
Chancellor

INTRODUCTIONS Colonel Robert L. Ostrander, Jr.
Aerospace Studies

ADDRESS Brigadier General Timothy A. Peppe
Director, Joint Experimentation, USACOM

ADMINISTRATION OF THE OATH
OF OFFICE Colonel Robert L. Ostrander, Jr.
Professor of Aerospace Studies

Captain Douglas B. Guthe, Jr.
Professor of Naval Science

Lieutenant Colonel David J. Cannon
Professor of Military Science

PRESENTATION OF CERTIFICATES Dr. Marye Anne Fox
Brigadier General Timothy A. Peppe

BENEDICTION Chaplain Helton

RETIRING OF THE COLORS Multi-Service Color Guard

RECESSIONAL North Carolina State University British Brass Band
The audience is requested to remain seated until the Recessional music is completed.

Graduation Ushers

Air Force ROTC Ushers

Shawn Brown
Matt Johnson
Nicole O'Neal
Elizabeth Van Patten

Army ROTC Users

Chad Caison
Ben Carron
Ed Gomez
Mark Hangen
Melissa Harris
Courtney Hirsh
John Horvath
Tricia Jordan
Marcia Merritt

Graduation Marshals

Nicole M. Ambrozezitch
Carla M. Anderson
Joy L. Barnes
Akhil Bhaskar
Bianca M. Bradford
JoAnn M. Bricker
Cori G. Bunn
Julie Cheng
Tommy Cleveland
Kent Dezendorf
Kathryn J. Ellis
Egbe Eni

Kathryn M. Ernest
Derek M. Foster
Parker E. Haddock
Zack Helms
Jason G. Ho
Brandi D. Holcomb
Dana N. Hughes
Margaret-Ellen Jeffreys
Daniel C. Li
Kelly M. Marks
Jen J. McLean
Matthew A. Meares

Kelly Neuschaefer
Rachael T. Overcash
Terrell G. Russell
Matthew C. Senter
Ryan M. Shenoha
Jonathan E. Shorter
Andrew M. Southerland
Michele P. Tam
Emily K. Townley
Jennifer L. Ulichny
Henry C. Ward
Keisha C. Williamson

Academic Costume

Academic gowns represent a tradition handed down from the universities of the Middle Ages. These institutions were founded by the Church; the students, being clerics, were obliged to wear the prescribed gowns at all times. Round caps later became square mortarboards; the hoods, originally cowls attached to the gowns, could be slipped over the head for warmth.

Many European universities have distinctive caps and gowns which are different from those commonly used in this country. Some of the gowns are of bright colors and some are embellished with fur. A number of these may be noted in the procession.

The usual color for academic gowns in the United States is black. The bachelor's gown is worn closed, the master's and doctor's may be worn open or closed. The shape of the sleeve is the distinguishing mark of the gown: bachelor--long pointed sleeves; master--oblong, square cut in the back with an arc cut away in front; doctor--bell shaped.

Caps are black. The tassels for the Ph.D. degree are gold and those for other graduate and professional degrees may be of the color corresponding to the trimmings on the hoods.

Of all the components of the academic costume, the hood bears the heaviest symbolic burden. The hood must make clear the level of the degree, the faculty in which it was given, and the institution which awarded it. The level of the degree is shown by the size of the hood, the width of the velvet trimming, and in the case of doctors, by the shape. The bachelor's, master's, and doctor's hoods are three feet, three and one-half feet, and four feet long, respectively. The velvet trimming in the same order is two, three, and five inches and extends all around the hood on the exposed edge. This same trimming identifies the faculty in which the degree was awarded. For each faculty there is a corresponding color; so a glance at the trimming is all that is needed to identify the faculty. A partial list of the colors follows: Agriculture, maize; Architecture and Art, brown; Science, golden yellow; Economics, copper; Education, light blue; Engineering, orange; Forestry, russet; Physical Education, sage green; Religion, scarlet; Speech, silver gray; Veterinary Medicine, gray; Textiles, wine red. The following faculties have the same color--dark blue: Anthropology, History, Languages, Literature, Philosophy, Political Science, Sociology.

Academic Honors

Honors participants benefit from a more individualized and rigorous approach to their desired degree through special classes, seminars and individual research.

Undergraduate degree honor designations are:

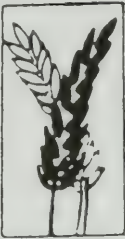
Cum Laude--for GPA 3.250 through 3.499 (white sash)

Magna Cum Laude--for GPA 3.500 through 3.749 (red sash)

Summa Cum Laude--for GPA 3.750 and above (gold sash)

UNDERGRADUATE DEGREES

College of Agriculture and Life Sciences



BACHELOR OF SCIENCE IN BIOLOGICAL AND AGRICULTURAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the
College of Engineering.

Degree Conferred August 11, 1998

Andrew Thomas Griffin Clinton

Degree To Be Conferred December 16, 1998

Michael Todd Frost Raleigh

BACHELOR OF SCIENCE IN BIOLOGICAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the
College of Engineering.

Degrees Conferred June 26, 1998

John Bryan Braxton Deep Run
Laura Heather Cruse Spruce Pine

Degrees To Be Conferred December 16, 1998

Nathan Bennett Hill High Point
James Wayne Howard Lucama
Keith Duane Larick Raleigh
Jodi Pace Fayetteville
Heather Lynn Stutler Clayton

BACHELOR OF SCIENCE IN AGRICULTURAL BUSINESS MANAGEMENT

Degree Conferred June 26, 1998

Charles Ryan Anderson Charlotte

Degrees Conferred August 11, 1998

Jonathan David Kennedy Greensboro

** Danny Lee Wheless Youngsville

Degrees To Be Conferred December 16, 1998

Lee James Beck Raleigh

James Robert Blackwell Boiling Springs, SC

Kevin Ryan Carter Warrenton

George Shelton Davis III Elizabeth City

Ashley Hillman Edwards Raleigh

Franklin Travis Floyd Cerro Gordo

Mark Cole Fowler Tabor City

Carrie Brown Green Louisburg

Randy Wade Johnson Four Oaks

* Gregg Allen Lefever Statesville

John William McAuley III Ridgefield, CT

Angela Joy Nixon Raleigh

+ Jonathan Seth Owens Lexington

** William Wesley Pegram IV Monroe

Nelson Parker Powell Clinton

Amry Bess Shoffner Pleasant Garden

+* Preston Lee Sutton La Grange

* William Todd Ussery Raleigh

Jeremy Franklin Williams Reidsville

Claire Ashley Wooten Charlotte

Judson Bryan Wortman Casar

BACHELOR OF SCIENCE IN AGRICULTURAL AND ENVIRONMENTAL TECHNOLOGY

Degrees Conferred August 11, 1998

Christopher Clay Koontz Lexington

Joseph Heath Slade Blanch

Degrees To Be Conferred December 16, 1998

Teamon E Mills Charlotte

+ Jonathan Seth Owens Lexington

+* Preston Lee Sutton La Grange

BACHELOR OF SCIENCE IN AGRICULTURAL AND EXTENSION EDUCATION

Degrees Conferred June 26, 1998

Cheryl Lea McCoy	Cove City
Megan Marie Southerland	Mount Olive

Degrees Conferred August 11, 1998

James Scott Rhodes	Four Oaks
Tracey Renee Weidrick	Elizabeth City

Degrees To Be Conferred December 16, 1998

Beth Ann Bubacz	Raleigh
*** John Charles Cothren	Hays
** Robert Jason Davis	Newton Grove
Brandy Melissa Silliman	China Grove

BACHELOR OF SCIENCE IN AGRONOMY

Degree Conferred August 11, 1998

Ronald Haywood Pittman	Richlands
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Degrees To Be Conferred December 16, 1998

Jason Michael Abbott	Henderson
James Oates Burch	Faison
Ernest Lee Butler	Eden
David Lawrence Coker	Raleigh
* Robert Dowe Edwards	Whitakers
* Jeffrey Glenn Hilf	Coraopolis, PA
Jennifer Ellen Maples	Carthage
Audrey Scott McArthur	Asheville
*** Allen James McNally	Durham
* Gerald Leo Miller	Jacksonville, FL
* Charles Wendell Murray	Raleigh
Cale Edward Tart	Newton Grove
William Clark Walton	Burlington
Shannon Joe Ward	Clarkton
Danny Ellis Williams	Raleigh
Christopher Damien Wittekind	Cullowhee

BACHELOR OF SCIENCE IN ANIMAL SCIENCE

Degrees Conferred June 26, 1998

Courtney Susanne Cox	Enfield
Terri Lynn Mecomber	Louisburg
Anthony Wayne Smith	Beaufort
Kristie Joy Stearns	Weddington

* Erik Stahl Strunck	Raleigh
Ashley Holton Whittington	Raleigh

Degrees Conferred August 11, 1998

Jo Ellen Beasley	Four Oaks
Rebecca Ruth High	Fayetteville
Jaclyn Jackson	Charlotte

Degrees To Be Conferred December 16, 1998

Katherine Lindsay Astin	Wilson
Beth Ann Blake	Greensboro
John Graham Bowen	Harrells
Heather Laraine Carr	Goshen, NJ
Emily Blythe Colclough	Durham
*** Rebecca Elizabeth Ehrhardt	Julian
+ Christopher Bradley Goforth	Troy
Ashley Chandell Halvorson	Kings Mountain
Elizabeth Eriksson Howell	Houston, TX
Joseph Scott Matthews	Roseboro
Angela Marie Mims	Surf City
*** Jennifer Gayle Montgomery	Monroe
HS*** Loretta Diana Pesteanu-Somogyi	Weldon
Shelby Elizabeth Pruitt	Wade
Cynthia Leanne Sanderford	Raleigh
Karmin Lin Shepard	Jacksonville
Suvadra Devi Sinha	Hickory
Julie Ann Smith	Sophia
* Kelly Gregory Snyder	Raleigh
Cindy Darlene Stewart	Gastonia
Richard Walter Suggs	Pinebluff
Charles Monroe Thompson	Carthage

BACHELOR OF SCIENCE IN APPLIED SOCIOLOGY

Degrees Conferred August 11, 1998

+** Lorraine Ann Gregus	Somers, NY
** Stephen Lee Sutton	Raleigh

Degrees To Be Conferred December 16, 1998

Amanda Marie Cheek	Lenoir
Jason Patrick Pierce	Wilson

BACHELOR OF SCIENCE IN BIOCHEMISTRY

Degrees Conferred June 26, 1998

Edgar Stephen Pittman II	Lumberton
Clint Brian Smith	Charlotte

Degrees Conferred August 11, 1998

+	Kiernan Thomas DeAngelis	Durham
**	Sandy Ann Ersley	Erie, PA
+	David Michael Pressley	Hendersonville
+	Shivani Suresh Shah	Gallup, NM

Degrees To Be Conferred December 16, 1998

+	Danielle Teresa Bach	Raleigh
	Jeong Mo Bang	Raleigh
HS+*	Salam Ghazi Bidwan	Wilmington
	Kelly Lynn Conner	Shelby
	Rebecca Anne Frum	Gastonia
	Christina Lee Gibson	Trinity
	Timour Seddiq Haider	Bernardsville, NJ
+*	Kelly Ann Hershberger	Roanoke Rapids
	Amy Cecile Hoover-Blackman	Modesto, CA
	Jonni Jo Keech	Iron Station
	Jennifer Lyn Keele	Rochester, NY
*	Marcus Thomas Lewis	Wilmington
+**	Molly Lynn Mast	Roxboro
	James Norman McNamara	Raleigh
***	Johnnie Lewis Moultrie	Fayetteville
***	Ayaz Pathan	Cary
	Monica Liliana Ramos	Charlotte
***	Shannon Scholl Vish	Raleigh
	Dennis Hal Whitley, Jr.	Middlesex
	Marguerite Lou Wilson	Rocky Mount

BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES

Degrees Conferred June 26, 1998

*	Jennifer Elizabeth Atwater	Yanceyville
	Olivia Coats Dominick	Raleigh
	Nancy Jennifer Hulbert	Wilmington
	Hallema Adilah Mitchell	Kinston

Degrees Conferred August 11, 1998

+	Titus Lamont Hopper	Shelby
*	Shari Lyn Kaplan	Raleigh
	Thomas Jacob Kropp III	Worcester, MA
*	Heather Elizabeth Owens	Oxford
	Pamela Rowan Saxman	Sanford

Degrees To Be Conferred December 16, 1998

**	Richard John Adrian	Raleigh
**	Elka Karen Armstrong	Annandale, VA

	Jonathan Randall Bridges	Sanford
*	Elzbieta Bule	Cary
*	Chad Eric Burris	Pecoia, IL
**	Quynh-Mai Le Cao	Raleigh
*	Melissa Champlin Caughey	Wilmington
	Jaime Rebekah Farrow	Spring Lake
H***	Rebecca Anne Foor	Hope Mills
+	Christopher Bradley Goforth	Troy
*	Erin Patricia Holleman	Kannapolis
**	Irene Rita Lee	Raleigh
	Geoffrey Todd Lewis	Charlotte
	Dennis Edward McBride	Wake Forest
	Darell Wayne McCoy	Pinebluff
**	Patrice Marie McDermott	Amesbury, MA
	Samantha Turia McCoy	Raleigh
	Karen Marie McNamara	Burlington
+	Kathryn Marie Meyer	Rocky Mount
	Michael Andrew Miller	Willow Spring
	Aimee Georges Nakhle'	Pilot Mountain
H	Nancy Aileen Oppenheim	Raleigh
*	Tracy Lynne Pence	Olney, MD
+++	Jennifer Lynn Shearin	Raleigh
*	Tracy Louise Skrabut	Saginaw, MI
	Cecil Charles Smith III	Lumberton
	Amanda Kay Wall	Garner
	Laura Shelly Warren	Fayetteville
*	Brett Michael Wineland	Raleigh

BACHELOR OF SCIENCE IN BOTANY

Degrees To Be Conferred December 16, 1998

Ellen Marie Donlan	Miami Springs, FL
Hollie Leigh Garner	Macon, GA

BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES

Degrees To Be Conferred December 16, 1998

*	Jennifer Mitchell Drake	Lilburn, GA
S+***	Laura Erin England	Raleigh
	Ramsey Lee Gurley	Selma
	Nathan Aaron Hinson	Jackson Springs
	Andrew Corey Lasater	Mount Olive
	Brian Charles Stewart	Mount Gilead, OH

BACHELOR OF SCIENCE IN FISHERIES AND WILDLIFE SCIENCES

Degrees To Be Conferred December 16, 1998

Steven Robert Currie	Raleigh
Matthew Wayne Garrett	Hickory

	Jean Elizabeth Hannon	Chapel Hill
***	Paul Kostovick	Harrison, ME
	Eric Glendon McCormick	Asheville
	Christopher Don McNeilly	Connelly Springs
***	Nicholas Dino Principe	Chapel Hill
	Kelly Victoria Redmond	Clemmons
	Jonathan Paul Rose	Tarboro
	Tyler Patrick Stanton	Lumberton
*	Beau Judson Willsey	Swansboro

BACHELOR OF SCIENCE IN FOOD SCIENCE

Degree Conferred August 11, 1998

Ilana Kurts	Edenton
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Degrees To Be Conferred December 16, 1998

	Melinda Whitfield Darden	Snow Hill
	Gena Renee Draughon	Garner
	Jill Amanda Godfrey	Springfield, VA
	Anne Cecilia Haas	Gilford, NH
***	Heather Jennifer Hickman	Sanford
	Jennifer Ann Maygar	Durham
	Jodie Anne McKenna	Raleigh
+	Staci Raquel McNair	Halifax
	Shavon Lesha Robbins	Wilmington
	Robert Douglas Sessoms III	Raleigh
+	Daniera Zenobia Wilson	Charlotte
	Kate Elizabeth Young	Raleigh

BACHELOR OF SCIENCE IN HORTICULTURAL SCIENCE

Degree Conferred August 11, 1998

Timothy Jay Kelly	Wilmington
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Degrees To Be Conferred December 16, 1998

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	Carrie Lynnette Blackman	Sanford
	Samuel Heath Brickhouse	Columbia
	Joshua Emmanuel Bullock	Charlotte
	James Brian Caldwell	Boone
	Shannon Marie Carroll	Raleigh
	David Thomas Case	Suffolk, VA
**	April Dawn Chastain	Yanceyville
*	Monica Rebecca Dunn	Benson
	Jonathan Harris Ervin	Edenton
	Jaime Lynn Hankins	Eden
*	Christopher Dean Kines	Lexington
	Jeffery Dale Leagan	Smithfield

Richard Lynn Nixon	Belhaven
Brian Scott Puckett	Concord
** Mark Edwin Reaves	Greensboro
Christopher Michael Sherrill	Culowhee
Kevin Neill Sipe	Claremont
Gerald Amon Stroud	Kinston
Edward James Tanner	Warrenton, VA
Jeffrey Allen Taylor	Fayetteville

BACHELOR OF SCIENCE IN MEDICAL TECHNOLOGY

Degree Conferred August 11, 1998

Melanie Louise Crase	Raleigh
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BACHELOR OF SCIENCE IN MICROBIOLOGY

Degree Conferred June 26, 1998

** Kristine Harlan Ashton	Raleigh
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Degree Conferred August 11, 1998

*** Richard Edward Zielinski	Saint Croix, Virgin Islands
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Degrees To Be Conferred December 16, 1998

Wesley Scott Daughtridge	Apex
Eric Reid Hastings	Raleigh
Ashley Rebecca Hooks	Charlotte
Rebeca Ann Lewis	Huntington, WV
+** Molly Lynn Mast	Roxboro
+ Jennifer Della McWilliams	Grifton
+ Kathryn Marie Meyer	Rocky Mount
Glenn Wayne Mims	Kingstree, SC
Yolanda Marie Russ	Wilmington
Rosalie Ann Satcher	Clayton
Kelly Tyler	Newport, RI

BACHELOR OF SCIENCE IN NATURAL RESOURCES

Degree Conferred August 11, 1998

Darrell Chris Hill	Kinston
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Degree To Be Conferred December 16, 1998

Brianna Catherine Roberts	Benson
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BACHELOR OF SCIENCE IN POULTRY SCIENCE

Degree Conferred August 11, 1998

Robert Scott Williams Durham

Degrees To Be Conferred December 16, 1998

* Joseph Gwynn Gaddy Morven
*** Maria Melinda Bernales Sangalang Burlington
Karen Suzanne Thomas Wilson
Heather Michelle Wall Hamptonville

BACHELOR OF SCIENCE IN ZOOLOGY

Degrees Conferred June 26, 1998

George Ruffin Benton IV Brevard
Kristen Elizabeth Gilles Rocky Mount
Lee Edward Kokoszka Madison, WI
Erin Paige Manning Poolesville, MD
*** Matthew Reid Remke Raleigh
Rachel Dawn Singletary Cary

Degrees Conferred August 11, 1998

Jamaal Jameel Ali Raleigh
Donna Fay Anderson Asheville
Martin Glenn Cox Knightdale
Christopher John Hoyle Gastonia
Cherrol DeVae Moore Raleigh
* Kelly Shaw Parker Manassas, VA
Brian Adrian-Durand Smith Spartanburg, SC

Degrees To Be Conferred December 16, 1998

Jessica Maria Anderson Charlotte
* Zahra Sidra Baloch Cary
Rachel Barros São Paulo, Brazil
* Mark Stewart Blume Charlotte
** Aron Rhodes Boney Nashville
Ann Taylor Bowen Raleigh
Katie Marie Cloonan Raleigh
S* Mandy Louise Crisp Pinetops
Mark Thomas Davidson Charlotte
Kelly Leigh Denny Oxford
** Daniel Joseph Deskevich Charlotte
* Jennifer Lynn Fail Goldsboro
Alganesh Gebremeskel Raleigh
Kymberly Demetra Gorham Farmville
Melanie Diane Harrington Salisbury
Elizabeth Shapley Highley Charlotte

**	William Yong Sung Ko	Lincoln, NE
	Anna Elizabeth Leonard	Lexington
HS***	Abee Christian Lowman	Chapel Hill
***	Rondi Kay Martin	Rolette, ND
	Maureen Susan McIntyre	Charlotte
	John Floyd Mearns	Wilmington
	John Andrew Mason Meyer	Hampstead
	Mohamed Ismail Mohamed	Raleigh
***	Emily Gail Page	Newport
	Rose Sun Park	Raleigh
H*	Sonal Jayendrakumar Patel	Valdese
+	Patrick McQuown Roberson	Raleigh
***	Jennifer Lynn Roberts	Charlotte
	Donna Renee Robertson	Garner
	Minta Sabrina Rocheleau	High Point
	Daniel Abram Rodbourn	Godwin
	Jill Meredith Schulze	Damascus, MD
	Crystal Moshawn Soles	High Point
	Debra Ann Stanczak	Raleigh
*	Francis Jan-Yeh Sun	Durham
	LaTercha Louise Taylor	Ridgeland, SC
	Jenny Joanna Tomlinson	Wilson
	Cezanne Avril Trent	Ruffin
	Kimberly Ann Twiford	Rocky Mount
	Rodney Antoine Watson	Clayton
	Holly Payne Weathersbee	Monroe

School of Design

BACHELOR OF ARCHITECTURE

Degree Conferred December 16, 1998

Leslie Edward Linsmier Charlotte

BACHELOR OF ART AND DESIGN

Degree Conferred June 26, 1998

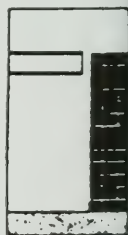
Joseph Curtis Hall Harlem, NY

Degrees Conferred August 11, 1998

** Rachel Rae Chow New Brunswick, NJ

* Heather Michelle Mauser Raleigh

John Dock Myrick II Raleigh



Degrees To Be Conferred December 16, 1998

Christy Lynn Bateman	Belmont
Melanie Anne Blythe	Burlington
* Helen Ya-Hsien Chang	Charlotte
Jonathan Bradley Hoye	Raleigh
* Julie Rosanne McEntire	Randleman
Eric Alexander Thompson	Cedar Grove

BACHELOR OF ENVIRONMENTAL DESIGN IN ARCHITECTURE

Degrees To Be Conferred December 16, 1998

Robert Dean Anastes	Charlotte
* Naa Aku Adjabeng Ankrah	Mayslanding, NJ
Amy Marie Blankenstein	Raleigh
Shawn David Donovan	Westminister, MD
* Rodney Chadwick Everhart	Wrightsville Beach
Vanessa Elizabeth Stack	Raleigh
** Leland Harold Ulery	Costa Mesa, CA

BACHELOR OF GRAPHIC DESIGN

Degree Conferred June 26, 1998

James Aaron Cruse	Fayetteville
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Degrees To Be Conferred December 16, 1998

* Mark Anthony Bertone	Raleigh
Caroline Elizabeth Newsome	Tampa, FL
* Matthew Owen Peterson	Cary
* George Leonard Scott	Monroe, NJ
Manuel Torres III	Greensboro

BACHELOR OF INDUSTRIAL DESIGN

Degree Conferred June 26, 1998

Frank William Doherty III	Raleigh
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Degree Conferred August 11, 1998

+** Lorraine Ann Gregus	Somers, NY
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Degrees To Be Conferred December 16, 1998

* Bonnie Rae Allison	Mooresboro
David Alexander Earp	Charlotte
Scott Hsin-Kuan Lin	Cary
Regina Tarae Massey	Shelby

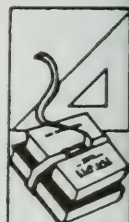
San Ng	Forest Hills, NY
* Jesse Clifford Paden	Chapel Hill

BACHELOR OF LANDSCAPE ARCHITECTURE

Degrees Conferred December 16, 1998

George Marvin Jenkins III	Gastonia
Aaron Joseph Newton	Concord

College of Education and Psychology



BACHELOR OF ARTS IN PSYCHOLOGY

Degrees Conferred June 26, 1998

* Amanda Nicole Bumgarner	Weaverville
Angela Christine Carmichael	Walnut Cove
Andrew Baggett Childers	Lexington
Amy Elizabeth Glidewell	Greensboro
** Colleen Elizabeth Lennon	Raleigh
Angie Renée Phillips	Coats
Jaime Michelle Prater	Mebane
H* Heather Dawn Rhea	Raleigh
Johneiquel D'Vonna Smith	Savannah, GA
Alvin Arbrè Sturdivant	Polkton
Julie Adger Watts	Raleigh

Degrees Conferred August 11, 1998

Natalie Dawn Brooks	Fuquay-Varina
Rachel Ellen Hardee	Raleigh
Corey Richard Lafferty	Concord
Shanna Leigh McDowell	Asheboro
Shonita Renee Savage	Greenville

Degrees To Be Conferred December 16, 1998

** David Amos Barfield	Armuchee, GA
*** Pamela Joan Beall	Raleigh
Chad Everett Bowers	Wilkesboro
Megan Lyn Brown	Cary
Kimberly Ann Commons	Raleigh
Kelley Margaret Edgerton	Durham
* Jennifer Len Ellis	Apex
* Rana Fakhoury	Raleigh

Julie Elizabeth Fuller	Raleigh
Steven Brian Gallo	Clemmons
Heather Rene Gwyn	Pleasant Garden
Amanda Helen Haire	Stedman
Scott Michael Lukse	Charlotte
HS** Megan Christine Marvel	Clayton
* Dancy Calvin Levon Mathis	Warsaw
Jeffrey Michael Matisoff	Cary
* Heather Ann McHale	Charlotte
Erica Lee Miles	Monroe
** Katherine Joan Montes	Germantown, MD
Pamala Marie Newman	Raleigh
Leta Katherine Parrish	Selma
Tara Leigh Pennington	Raleigh
** Erin Amanda Porn	Hillsdale, MI
** Angela Kathleen Rattray	Angier
Jessica Robin Reaves	Cary
Julia Katrine Roberts	Burlington
* Kortney Leigh Schell	Northbrook, IL
Katherine Jane Schmitt	Charlotte
Christine R. Severin	Middleton, NY
* Heidi Leah Smith	Westerville, OH
* Holly Renee Smith	Stoneville
Robin Jeannette Suka	Saint Petersburg, FL
* Royce Martin Testa	Redondo Beach, CA
Courtney Lane Thomas	Apex
Natalie Lynette Thomas	Salisbury
Sofia Yolanda Vargas	Raleigh
Chester Arthur Williams, Jr.	Charlotte

BACHELOR OF SCIENCE IN EDUCATION

Education, General Studies

Degrees Conferred June 26, 1998

Bradley Harry Bauer	Southampton, NJ
Kimberly Alice Rogers	Washington

Degrees Conferred August 11, 1998

Meredith Elizabeth Grubbs	Charleston, SC
Kimberly Jewel Kayser	Richlands

Degrees To Be Conferred December 16, 1998

Anthony Devon Hair	Stedman
Michelle Diane Sauter	Port Jefferson, NY
Heather Marie Thornton	Newton Grove

Health Occupations, Teacher Education

Degree To Be Conferred December 16, 1998

*** Laura Myers Stabler Chapel Hill

Language Arts and Social Studies, Middle Grades

Degree Conferred June 26, 1998

* Ann Clayton Pierce Kinston

Marketing Education for Teachers

Degree To Be Conferred December 16, 1998

* Karen Michelle Brawner Sindes Hanover, IN

Mathematics Education

Degree Conferred June 26, 1998

* Amy Elizabeth Malami Raleigh

Degree Conferred August 11, 1998

* Rochelle Lynn Brinson Dahlonge, GA

Degrees To Be Conferred December 16, 1998

* Fozia Ashraf Raleigh
Angela Dale Pitts Manteo
Michael Graham Workman Burlington

Mathematics Education, Middle Grades

Degree To Be Conferred December 16, 1998

*** Eric Lee Phillips Garner

Mathematics and Science, Middle Grades

Degrees To Be Conferred December 16, 1998

David Jackson Cooper, Jr. Henderson
Kristin Henderson Gilewicz Cary

Science Education

Degree Conferred June 26, 1998

* Shanda Annette Hill Enfield

Degrees To Be Conferred December 16, 1998

Christopher Bronson	Mount Olive
Casey Neal Clements	Virginia Beach, VA
** Amy Bush Dowden	Charleston, SC
Emily Jane Harter	Bakersville
+ Titus Lamont Hopper	Shelby
*** Stephanie Byrd Leonard	Four Oaks
+*** Jennifer Lynn Shearin	Raleigh
Eric Bradley Willard	Pinnacle
S*** Wendy Lovelace Willis	Lawndale

Science Education, Middle Grades

Degree To Be Conferred December 16, 1998

Jeannie Rachel Blinson	Knightdale
------------------------	------------

Technology Education

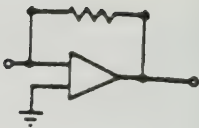
Degree Conferred August 11, 1998

** Judith Warren Simmons	Raleigh
--------------------------	---------

Degrees To Be Conferred December 16, 1998

Brian Emetrius Caldwell	Norfolk, VA
Joshua Shane Clayton	Roxboro
Maurice Torrez Frazier	Gloucester, VA
Kwame Ayinde Hawkins	Durham
Ginny Michelle Kirk	Timberlake
James Durand Ogburn	Charlotte
* Damon Forrest Plyler	Fayetteville
Bryce Smith Thompson	Plymouth
** Jake Robert Weber	Wappingers Falls, NY

College of Engineering



BACHELOR OF SCIENCE IN BIOLOGICAL AND AGRICULTURAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

Degree Conferred August 11, 1998

Andrew Thomas Griffin Clinton

Degree To Be Conferred December 16, 1998

Michael Todd Frost Raleigh

BACHELOR OF SCIENCE IN BIOLOGICAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

Degrees Conferred June 26, 1998

John Bryan Braxton Deep Run
Laura Heather Cruse Spruce Pine

Degrees To Be Conferred December 16, 1998

Nathan Bennett Hill High Point
James Wayne Howard Lucama
Keith Duane Larick Raleigh
Jodi Pace Fayetteville
Heather Lynn Stutler Clayton

BACHELOR OF SCIENCE IN TEXTILE ENGINEERING

Jointly administered by the College of Textiles and the College of Engineering.

Degrees To Be Conferred December 16, 1998

** Zeb Wilkes Atkinson Greenville
Bradley Hamilton Faucette Burlington
Alejandro Martin Rossato Burlington
* Benjamin David Wiese Valdese

AEROSPACE ENGINEER

Degree To Be Conferred December 16, 1998

Amir Kamyar Kheradpir Tehran, Iran

BACHELOR OF SCIENCE IN AEROSPACE ENGINEERING

Degree To Be Conferred December 16, 1998

S** Melissa Lynn Manning Burnsville

BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

Degrees Conferred June 26, 1998

Rachel Marie Dauenhauer Charlotte

* Mimi Vo Winston-Salem

Degrees Conferred August 11, 1998

+*** Joseph Scott Henderson Wallace

** Robert Frederick Jackson Shelby

* Hao Quang La Raleigh

Degrees To Be Conferred December 16, 1998

Mark Douglas Anthony Charlotte

Kristin Susan Arnold Roseville, MN

* Tylisha Marie Baber Greensboro

Anjana Suryakant Bhuta Chesterbrook, PA

John Thomas Blakeney Greenville

John Henry Bullock III Downingtown, PA

Michael Scottie Canipe Catawba

+ Mayo Elisah Collier III Florence, SC

*** David Arthur Council Williamston

Lynette Dawn Griffin Williamston

Stephen Andrew Hall Louisburg

+* John Bryant Harvey, Jr. Charlottesville, VA

Nicholas Tzoupo Hong Cary

Natasha Renettia Johnson Kannapolis

Brandy Vanese McGraw Matthews

+ Daniel Mottola Wilmington

+** Troy Anthony Muro Hollidaysburg, PA

La'Velle Fitzgerald Peterkin Red Springs

S** Holly Metz Pollock Greenville

Paul John Prucnal Monroeville, PA

+*** Matthew Christian Quick Nelson, VA

Kristy Anne Richie Winston-Salem

Sana Murawwah Saleh Durham

Jodie Beth Samp Arden

S+*** George Brent Shorter Roanoke, VA

+***	Christopher Lawrence Swift	Dalton, MA
	Samuel Leonard Tynch	Edenton
	Sherri Tennille Vollmer	Louisburg
	Michael Allen Will	Matthews
***	Yen Chun Wu	Raleigh
+*	Christina Buchanan Yochelson	Spruce Pine

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Degrees Conferred June 26, 1998

	Justin Malcolm Fore	Carolina Beach
*	Angella Jean Janisch	Thief River Falls, MN
	Jonathan Harris Weathersbee	Albemarle

Degrees Conferred August 11, 1998

+***	John Edward Hendrickson	Howell, NJ
	Jaime Lynn Wagoner	Winston-Salem

Degrees To Be Conferred December 16, 1998

*	Paul Brian Aubee	Moyock
**	Jeannie Natasha Barnes	Lucama
	Michael Johnson Biedell	Long Beach
**	Nathaniel Ellis Bolds, Jr.	High Point
	Michael Alan Brown	Abilene, TX
**	Henry Hilary Chmielinski	Plymouth, MA
*	Christopher Chung	Charlotte
**	Shannon Doyle Cotulla	Lodi, CA
+	Johnfree Dawayne Crite	Greensboro
	David William Czerr	Cherryville
	Michael Aidan Davis	Charlotte
	J Martin DeWar	Charlotte
	Kevin Anthony Feath	Goldsboro
	Michael Kevin Fox	Cornelius
	Joe Enoch Godwin, Jr.	Benson
	Worth Lewis Godwin III	Raleigh
***	Hyeri Park Kim	Raleigh
	Karan Krasaesindhu	Bangkok, Thailand
***	Thuan Luong Nguyen	Charlotte
	Virna Lissy Reynoso	San Juan, Puerto Rico
	Cameron Michael Rice	Cary
***	Michael Lawrence Rice	New Bern
	Christopher John Schramm	Clemmons
	Anupam Dinesh Shah	Cary
	Matthew Jay Shiring	Stevensville, MD
	Christopher Ryan Sondgroth	Tahoe City, CA
	Rynal Glen Stephenson	Willow Spring
	Colista Faye Sugg	Pikeville
	Jeffrey Lee Teague	Siler City
+	James Scott Ward	Matthews

Brandon Taylor Warren	Louisburg
Richard David Whyte	Raleigh
Scott Allen Zomek	Medford, NY

BACHELOR OF SCIENCE IN CIVIL ENGINEERING - CONSTRUCTION OPTION

Degree Conferred June 26, 1998

Matthew Todd Davis	West Jefferson
--------------------	----------------

Degrees To Be Conferred December 16, 1998

Jonathan Fletcher Hollifield	Bostic
** Adriana Nino	Cali, Colombia
Joshua Jean-Paul Taylor	Mount Airy

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

Degrees Conferred June 26, 1998

John Byron Blankenship	Barnardsville
Jason Ray Mauldin	Fayetteville
* Gregory Michael Thompson	Sanford
** Andy Lloyd Trotter	Lincolnton

Degrees Conferred August 11, 1998

** Edward David Beckman	Greenville
Michael Lee Ferguson II	Raleigh
Thomas Edward Gwinn, Jr.	Henderson
Deborah Lynn Shakal	Cary
Maria Sonia Welch	Fayetteville
Craig DeWayne Williams	Trenton
David Wesley Wyrick	Salisbury

Degrees To Be Conferred December 16, 1998

Stephen Miles Anderson	Raleigh
+* Shanna Marie Burleyson	Mount Pleasant
+ David Scott Burns	Fairview
Kuan-Chih Chen	Raleigh
Thomas Joshua Collins	Raleigh
** Adam Walter Conrady	Prior Lake, MN
+* Jeffrey Alexander Doane	Wrentham, MA
+** Justin Christopher Eckard	Matthews
*** Scott Thomas Elliott	Raleigh
+ Christopher Michael Ennis	Coats
Lee Robert Glanville	Fayetteville
* Michael John Haisma	Barrington, IL
James Arthur King	Apex
David Dwayne Lancaster	Monticello, GA
** Irfan Mazhar	Lahore, Pakistan

***	Patrick Thomas McElwee	Raleigh
+	Susan Leigh McNally	Waynesville
	Joel Moralina Ocampo	Durham
	Veasna Or	Charlotte
+	Toni Liberato Pietrantonio	Spencerport, NY
	Ahmed Adel Ramadan	Hays, KS
*	Karthik Ranjan	Hickory
	Christopher Kevin Ray	Wake Forest
***	David Thomas Rooker	Raleigh
**	Brian Patrick Schuller	Asheville
S***	Travis Allen Senter	Ramseur
	Donald Burton Thomas	Snow Hill
	Demond Keith Toraine	Clinton
***	Daniel Yiqin Wang	Germantown, MD
***	Qiao Xu	Chengdu, People's Republic of China
+	Bryan Loyd Young	Greenville

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

Degrees Conferred June 26, 1998

	Rabih Abdul-Hamid Dabboussi	Raleigh
*	James Arthur Davis	Wadesboro
	Robert Alson Gray, Jr.	Charlotte
	Christie Michelle Hawkins	Cove City
	Foong-Ha Lo Porter	Raleigh

Degrees Conferred August 11, 1998

	David Christopher Brogdon	Wilmington
	Brian Scott Daniel	Raleigh
	Stephen Shane Hunt	Louisburg
	Dong Ke Lieu	Hickory
	Kevin Larry Lippard	Raeford
	Thienhuong Thi Nguyen	Knightdale
	Daniel Richard O'Brien	Piqua, OH
	Hemantkumar Nanubhai Patel	Andrews, SC
***	Troy David Tolle	Waynesville
*	Nam Thanh Vo	Durham
**	Kent Bradley White	Durham
	Casey Dean Woods	Raleigh

Degrees To Be Conferred December 16, 1998

	Mamdouh Madhat Al Sayeh	Raleigh
	David Evan Bannister	Raleigh
	Joseph Reese Blair	Raleigh
*	Jeremy James Bridges	Statesville
*	Joseph Lloyd Brock	Moravian Falls
	Michael Stewart Browning	Plymouth
*	David Reid Cagle	McLeansville
	Jonathan Aaron Carothers	Mebane

* Lalitha Kumari Duddey	Raleigh
Todd Michael English	Raleigh
Joseph Lawrence Fell	Virginia Beach, VA
** George Richard Feller	Vilas
Derrick Werner Foley	Whiteville
Sushant Chandra Gargya	Raleigh
Stephen Michael Gibson	Fayetteville
HS*** Mark Alan Greer	Salem, VA
William Thomas Grussemyer, Jr.	Newark, DE
Justin Andre Henry	Raleigh
Matthew Todd Hilliard	Roanoke Rapids
*** Au Co Hoang Ho	Raleigh
Tracey Danette Howard	Goldsboro
Herbert Michel Hucks IV	Low Country, SC
Dharmesh Rasik Kharva	Baroda, India
Steven Paul Kim	Virginia Beach, VA
*** Hung Van Lam	Raleigh
Marlena Michelle Azalia Lucas	Rocky Mount
William Berry McMurray	Richmond, VA
Quang Dinh Nguyen	Chapel Hill
+ T. Jacob Nicholson	Phoenixville, PA
Herbert Wayne O'Quinn	Cameron
H** Charles Paul Oakes	Syracuse, NY
* Harold Ashley Pearson	Middlesex
Jeremy Edward Pflasterer	Raleigh
Zenon John Piatek	Poughkeepsie, NY
Andrew Alex Puch	Durham
Christopher Lee Shirley	Rocky Mount
Constantinos Skotidas	Concord
Nimesh Harkisandas Topiwala	Navsari, India
* Kevin Edward Vaughan	Raleigh
Dung Khanh Vu	Raleigh
Donald Arthur Washburn	Hendersonville
+*** Loreta Vasiliauskaite Wilson	Raleigh
** Cheyne Monroe Womble	Chapel Hill
Paul DeWayne Worley	Spivey's Corner

BACHELOR OF SCIENCE IN CONSTRUCTION ENGINEERING AND MANAGEMENT

Degrees Conferred August 11, 1998

Wendy Day Cockerham	Elkin
Stephen Shane Fincher	Fayetteville

Degree To Be Conferred December 16, 1998

Jason Edwin Bartley	Leicester
Brad Richard Cornwell	Shelby
* Shannon Dale Dorsey	Wilmington
** Jeff Hoyle Edney	Flat Rock
Jonathan Weldon Elkins	Raleigh
* Stewart Schumpert Laney	Rocky Mount

Joseph Alan Lohr	Raleigh
Brent Barden Morris	Garner
* Helen Virginia Murray	Monroe
Jason Ray Peterson	Goldsboro
Johnson Rabut Quiocho	Virginia Beach, VA
** Kevin Douglas Schmidt	Providence, RI
** Adam Lee Stephenson	Knightdale
* Jason Howard Walton	Boiling Springs

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

Degrees Conferred June 26, 1998

Trong Van Luong	Greensboro
** Svjetlana Pejdo	Mostar, Bosnia
* Ray Charles Ring	Asheville
Scott Joseph Sallor	Wilmington
* Nathan Gabriel Scarlett	Lexington

Degrees Conferred August 11, 1998

Ihab Ibrahim Abdelmuti	Raleigh
Terence Lynn Burney	Greenville
* Nathan Franklin Deese	Charlotte
James Steven Jones	Wadesboro
Hien Thai La	Raleigh
William Ocean Lam	Pasadena, CA
John Tipton Payne	Richmond, VA
*** Scott Mitchell Perelstein	Cary
*** Brian Jay Rechtenbaugh	Canistota, SD

Degrees To Be Conferred December 16, 1998

James Matthew Bauer	Raleigh
+* Shanna Marie Burleyson	Mount Pleasant
+ David Scott Burns	Fairview
Jacob Rameen Chitsaz	Raleigh
+* Jeffrey Alexander Doane	Wrentham, MA
+** Justin Christopher Eckard	Matthews
+ Christopher Michael Ennis	Coats
* Douglas Irving Evans	Asheboro
Rodney William France	Westfield
Brian Lee Green	Waxhaw
Matthew David Hambrick	Roanoke, VA
* Brent Richard Hefner	Taylorsville
** Brian Keith Henley	Clayton
Christopher Andrew Huffman	Hickory
Brandon Demond Johnson	Laurens, SC
*** Cory Paul Johnson	Grand Marais, MN
Eric Robert Julien	Wilmington
*** Brent Watson Lamm	Bailey
Sherri LaVie Linton	Asheville

	Anthony Clark Love	Burlington
	James Courtney Mack	Raleigh
	Jeffery Paul Mason	Raleigh
**	Bryan Hollins McChesney III	Midlothian
+***	Patrick Thomas McElwee	Raleigh
+	Susan Leigh McNally	Waynesville
	Johnny Shelton Moore, Jr.	Warsaw
	Marion Louis Newman	Columbia, SC
	Stephen Jeffery Paszt	Chocowinity
+	Toni Liberato Pietrantonio	Spencerport, NY
	Channing Evan Reiser	Greensboro
	Grace Kennedy Richter	Raleigh
+**	David Thomas Rooker	Raleigh
	Dominick Anthony Santore	Cary
*	Wayne Melvin Smith	Efland
***	Jeffrey Michael Strang	Durham
	Erick Thomas Swanson	Charlotte
*	Robert Alan Teller	Richmond, VA
	James Xavier Torok	Kernersville
	Kenneth Bryan Tysinger	Lexington
	Chunhui Wang	Charlotte
	Rodney Tyrone Warren	Elizabeth City
	Christopher Ryan White	Raleigh
	John Robert Wilkerson, Jr.	Durham
*	Yili Xu	Guangzhou, People's Republic of China
+	Bryan Loyd Young	Greenville

BACHELOR OF SCIENCE IN ENVIRONMENTAL ENGINEERING

Degrees Conferred June 26, 1998

	Cynthia Lynn Davis	Havelock
+***	John Edward Hendrickson	Howell, NJ

Degrees To Be Conferred December 16, 1998

*	James Winston Caldwell	Candler
+	Johnfree Dawayne Crite	Greensboro
	Liz Elaine Feliberty-Ruberté	San Germán, Puerto Rico
**	Allison Mae Goerss	Washington
	Gary Dale Hartong	North Canton, OH
*	Jeffrey Scott Nichol	Belle Vernon, PA
+	James Scott Ward	Matthews

BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

Degrees Conferred June 26, 1998

	Luis Rolando Figueroa	Guatemala City, Guatemala
	Christopher Ryan McNeill	West Jefferson

Degrees To Be Conferred December 16, 1998

	Kenya Yvonne Allen	Salisbury
	Anh Tuyet Aragon	Broadway
**	Eduardo Alfonso Arce Nieto	San Salvador, El Salvador
	Rodney Graham Bame	Salisbury
	Angela Christina Bradley	Asheville
	Kerri Anne Bray	East Liberty, OH
	Roxsard Denice Brown	Columbia, SC
	Brian Trent Caudill	Wilkesboro
	Stefan John Dodge	Charlotte
	Ralph Jarett Dollyhigh	Dobson
*	Vernon Bradley Elhart	Southern Pines
*	Brandon Keith Elliott	Hickory
	Waylon Hartley Ethridge	Rocky Mount
*	Estuardo José Figueroa	Guatemala City, Guatemala
	James Keith Flowers	Cary
	Robert Glenn Green	Spring Hope
	Phillip Martin Greene	Elkin
	Eric Alexander Hatley	Albemarle
	Allen Brewer Hauser	Statesville
	Brian Lee Kendall	Swannanoa
	Rodney Emmett Lawing	Asheville
	Jennifer Jyi Lo	Chapel Hill
	Paresh Kantilal Mutha	Charlotte
	Tammy Lynn Norris	Selma
	Emin Kerim Ozbilge	Istanbul, Turkey
	Jonathan Rodney Pearson	Morganton
	Jeremy Lee Plyler	Troutman
	Lisa Lankford Rinnier	Salisbury
	Durkhany Sadat	Raleigh
***	Timothy Jay Smith	Morganton
*	Sean Michael Terry	Lacey Township, NJ
	David Drake Thompson	Henderson
	Victor Estuardo Unda Vila	Guatemala City, Guatemala
	Christopher Todd Yancey	Charlotte

BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING, FURNITURE MANUFACTURING

Degrees To Be Conferred December 16, 1998

*	Ashley Heath Patterson	Trinity
	Ramez Najib Qubain	Amman, Jordan
	Noel Patrick Rowe	Richmond, VA

BACHELOR OF SCIENCE IN MATERIALS SCIENCE AND ENGINEERING

Degrees Conferred August 11, 1998

*	Charles Edward Draper, Jr.	High Point
	Edward Demond Keys	Kinston

James Paul Mewkill Sydney, Australia

Degrees To Be Conferred December 16, 1998

S+*** Samuel Thomas Barron Raleigh
Greg Michael Dusetzina Chapel Hill
+ Todd William Miles Raleigh
*** James Frederick Mulling Garner

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

Degrees Conferred June 26, 1998

Dieter William Drake Albany, NY
Andrew Wilson Lilliston III Rocky Mount
* Timothy Neil Midgett Swansboro
Bruce Patrick Pickett Durham
Sean Kevin Treadway Asheville
Edward Kane Yang Raleigh

Degrees Conferred August 11, 1998

Terrence Lamont Berry Merry Hill
Bartlett Council Cranford Wendell
Patrick Wilson Duncan Monroe
Matthew Ashley Koch Apex
Michael Duncan McManus Raleigh
Jimmy Edward Murchison Greensboro
*** Charles Jacob Novak III Charlotte
Neil Jason Steinhagen Clinton, IA
Paul Richard Tuttle, Jr. Pinnacle

Degrees To Be Conferred December 16, 1998

David Charles Beaman Advance
Victor Thomas Bird Clayton
Shannon Ray Brown Raleigh
Brian Christian Carmalt Asheville
Alexander Brian Cook Reidsville
Thomas Ryan Covington Pilot Mountain
Colm J. Deloughery New City, NY
Oscar Mapile Dones Hillsborough, NJ
* Jan Nicole Elliott Candler
** Edward Keith Floyd Rocky Mount
Brian Harrison Gibson Rocky Mount
Troy O-Dell Grady Mount Olive
James Allan Gray Raleigh
*** Sonia Benita Haanskorf Raleigh
Jeffrey Romale Hall Fayetteville
* Derrick Lee Hamm Sparta
Jason Ray Hardee Greenville

	Brian Thomas Hassler	Chapel Hill
	Matias Dieter Heinrich	Greensboro
*	Robert Milon Hill	Cary
	Uthai Jacob Inthavong	Newton
+	Andrew Philip Jay	Alajuela, Costa Rica
	Kevin Scott Kirkup	Charlottesville, VA
	Tommy Dahn Kwia	Nimba, Liberia
*	Derek Alan Lang	Virginia Beach, VA
*	Deborah Ann Langheld	Cerritos, CA
	Carter Eliot Lunde	Rockville, MD
	Timothy Edward Lupo	Fairmont
+***	Glenn Jason Martin	Harrisburg, PA
*	Jason Foard Matthews	Manchester, MD
	Paul Dee McKeithan	Abbotsburg
+	Todd William Miles	Raleigh
	John Christian Mills	Tabor City
	Joshua Bryan Minter	Wilmington
	Malcolm Clement Moore II	Greensboro
	Michael Walter Nedriga	Savannah, GA
***	James Michael Nesbitt	Quarryville, PA
	Michael James O'Halloran	Freehold, NJ
	Isaac Panzarella	Niagara Falls, NY
	William Joseph Porter	Denver
*	Spencer Scott Pratt	Cary
	Paul Andrew Riddle	Statesville
	Brandon Foote Rooker	Norlina
***	Michael Charles Rossi	Asheville
***	Javier Hernando Santiago	Raleigh
	Barry Michael Simo	Greenville
	Wilson Rex Smith	Goldsboro
	Stuart James Sugg	Greenville
	Arthur Frederick Swanson	Raleigh
	Marcus Raymon Taylor	Clinton, MD
	Wilbert Todd Thornton	Clinton
*	Jose Irving Torres	Hendersonville
	Abbey Lynn Van Rood	Durham
	John Roy Whitaker	Siloam
	Travis Barling Wills	Alpharetta, GA
	Thomas Raymond Wolk	Glastonbury, CT
	Sung Yong Yu	Charlotte

BACHELOR OF SCIENCE IN NUCLEAR ENGINEERING

Degree Conferred June 26, 1998

Akira Sakabe Winston-Salem

College of Forest Resources



BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES

Degree To Be Conferred December 16, 1998

Kevin Edward O'Briant Red Springs

BACHELOR OF SCIENCE IN FISHERIES AND WILDLIFE SCIENCES

Degree To Be Conferred December 16, 1998

Nancy Leigh Warden Elizabeth City

BACHELOR OF SCIENCE IN FOREST MANAGEMENT

Degree Conferred June 26, 1998

Boice Elton Triplett III Belmont

Degree Conferred August 11, 1998

Ryan Todd Keeter Asheboro

BACHELOR OF SCIENCE IN NATURAL RESOURCES

Degree Conferred August 11, 1998

Darin Lee Burns Sanford

Degrees To Be Conferred December 16, 1998

Tony Joe Bell Fayetteville

Michael Sean Clark Raleigh

*** Lucy Ann Cromer Raleigh

Kelley Abbott Dennings Elkhorn, NE

* Timothy Ryan Dodge Cottage Grove, OR

Matthew Michael Haney Goldsboro

Philip Anthony Larson Lexington, KY

Katherine Helena Mertz Vienna, VA

*** David Paca Nishida Rocky Mount

BACHELOR OF SCIENCE IN PARKS, RECREATION AND TOURISM MANAGEMENT

Degrees Conferred August 11, 1998

Jason Paul Caspar Winston-Salem

John Christopher Danehower Forrest City, AR

*Co-major
*Cum Laude

H Honors Program
**Magna Cum Laude

S University Scholars Program
***Summa Cum Laude

Thomas Edward Loughlin, Jr.	Woodford, VA
* John Paul Schortinghouse, Jr.	Spruce Pine
Susan Marie Yerkes	Merrill, WI

Degrees To Be Conferred December 16, 1998

William Scott Barnard	Virginia Beach, VA
* Katherine Michelle Brame	Durham
Jeffrey Terrance Butler	Longwood, FL
Anthony Patrick Campione	Allentown
Ryan Michael Christian	High Point
Christie Cathlene Collins	Charlotte
Brandon Jerome Davis	Rome, GA
** Laura Ann Eddins	Garner
** Kristen Marie Gillespie	Tallahassee, FL
Heather Michele Greer	Raleigh
Chelsea Green Hancock	Oxford
Edith Bell Henninger	Raleigh
*** Bernd Werner Herrmann	Philadelphia, PA
* Jason Niles Horner	Middletown, NY
Jennifer Ann Liner	Winston-Salem
Brian Alan Long	Henderson
Walter Elliott Mayo	Plainsboro, NJ
Patrick Allen Moore	Clayton
Amy Kay Nichols	Raleigh
Paul Joseph Puccio	Castleton, NY
Barbara Ann Reason	Williamston
Russ Courtney Redd	Wake Forest
Charles James Russell	Wake Forest
** Jo-Anne Currin Scoggins	Garner
Eric Ryan Snipes	Morganton
Dennis William Stanley, Jr.	Cary
** Barbi Lynn Tart	Garner
Samuel Albert Thomas IV	Lexington
Michael Joseph Troutman	Apex
Michael Scott Warner	Beckley, WV
Julie Britt Weaver	Herndon, VA
Zarah Cherí Wetmore	Hickory
Haley Braxton Wightman	Concord

BACHELOR OF SCIENCE IN PULP AND PAPER SCIENCE AND TECHNOLOGY

Degrees To Be Conferred December 16, 1998

+ Chad Stafford Branch	Hopewell, VA
** Rouf Omar Chaudhry	Covington, VA
+ Mayo Elisah Collier III	Florence, SC
James Michael Cook	State Road
Roy Michael Corn	Hendersonville
Stephen Blake Farmer	Roanoke Rapids
Adam Cord Ferguson	Clayton
Eric Jefferson Fisher	Bayboro

	Kimberly LaWanda Geiger	Charlotte
+*	John Bryant Harvey, Jr.	Charlottesville, VA
+***	Glenn Jason Martin	Harrisburg, PA
	Dwayne Douglas Matthews	Williamston
	Charles Kevin Mundy	King William, VA
+**	Troy Anthony Muro	Hollidaysburg, PA
	James Michael Nixon	Tyner
+***	Matthew Christian Quick	Nelson, VA
S+***	George Brent Shorter	Roanoke, VA
+**	William Ashley Sparks	Roanoke Rapids
	Chin-Shu Su	Raleigh
+***	Christopher Lawrence Swift	Dalton, MA
	James Matthew Ward	Roanoke Rapids
+*	Christina Buchanan Yochelson	Spruce Pine

BACHELOR OF SCIENCE IN WOOD PRODUCTS

Degrees To Be Conferred December 16, 1998

James Andrew Guthrie	Carthage
Dennis Everett Motowylak	Fayetteville
Crystal Shipman	Whiteville
Reginald Gerard Watson	Weldon

College of Humanities and Social Sciences



BACHELOR OF ARTS IN COMMUNICATION

Degrees Conferred June 26, 1998

	Andrew Jon Barkett	Miami, FL
**	Deirdre Daniela Catlett	Durham
	David Christopher Edwards	Kinston
**	Kimberley Ann Hodakowski	Raleigh
	John Bain Mathewson	Raleigh
*	Hadley Gaye Misenheimer	Charlotte
	Heather Victoria Monast	Greenville
	Elizabeth Ann Redwine	Albemarle
**	Jessica Ann Rydzewski	Raleigh
*	Robin Stevenson Warren	Marlton, NJ
	Walter Page Warren	Clinton

Degrees Conferred August 11, 1998

Bryan Leland Barrow	Farmville
Michael Andrew Dixon	Willow Springs
Tamra Paige French	Coconut Creek, FL
Melissa Deanne Garrett	Terre Haute, IN
Paul Wellington Harris, Jr.	Zebulon
Evilla Annette Marosites	Sanford
Ruthlyn Elizabeth Mathers	Willow Spring
Jennifer Lynn Miller	Winston-Salem
Angela Williams Murchison	Sanford
Christopher Alan Puryear	Richmond, VA
Kristi Lea Rau	Fayetteville
Dameion Lamar Royal	New Bern
Todd Michael Smith	Horseheads, NY
Brian Powell Sutton	Keystone Heights, FL
Christina Elaine Thevaos	Greensboro
Gregory Louis Williamson	Charlotte

Degrees To Be Conferred December 16, 1998

	Damien Vastle Armstrong	Lauringburg
	Russell Hoyett Bass III	Tarboro
	Jason Christopher Blevins	Winston-Salem
	Shannon Dawn Bowser	Homer City, PA
*	Yolanda Domonique Brown	Charlotte
	Kendall Franklin Burgess	Wareham, MA
	Haywood Scott Carroll	Garner
S***	Emily Anna Cobb	Raleigh
	Stephanie Marie Colletti	Cary
	John Christopher Cook	Shelby
	Michael Jerome Cookson	Pittsfield, MA
	Michael Ronnie Cruz	Durham
	Kenneth Neil Davis	Swannanoa
	Lea Delicio	Somersworth, NH
	Sheetal Kiritkumar Desai	Durham
	Allison Edmundson Dew	Wilson
*	Danna Leigh Dickson	Raleigh
	Elizabeth Lynn Edwards	Raleigh
	Mary Kristine Elder	Burlington
	Elisa Cortina Fariss	Wendell
	Christopher David Francisco	Washington
	Nikita Charles Goodson	Raleigh
+	Michelle Lee Grainger	Raleigh
	Angela Mae Greenfield	Dudley
	Angela Michelle Griffie	Gastonia
	Julia Reid Hartzoge	Greensboro
*	Jasen Allen Hedrick	Raleigh
	Cari Susette Hicks	Raleigh
	Bryan Curtis Jones	Raleigh
	Michael John Kalna	Charlotte
	Karen Childres Klinger	Apex

	Shannon Faye Landen	Kinston
	Walter John Lang III	Winston-Salem
	Nytisha Talette Lee	Camden, SC
***	Jenifer Sue Lytle	Leesburg, VA
	Jennifer Sue Marchant	Raleigh
	Anna Maria Marshall	Rocky Mount
	Chadbourne Lee Marshall	Cary
	Karman Ashley Mayhew	Mooreville
	James Anthony McDonough	Moodus, CT
	Marcus Graham McIntyre	Raleigh
S+**	Jill McVey	Staten Island, NY
	Jennifer Lynn Merritt	Erie, PA
	Amanda Kelly Metcalfe	Roanoke Rapids
	Christine Anne Murphy	Califon, NJ
	Seamus Michael Murphy	Pittsburgh, PA
*	Nell Hunter Payne	Asheville
	Jennifer Lynn Pegram	Winston-Salem
	Tunica Michelle Pipkin	Lillington
	John Harrison Proctor	Greensboro
	Carey Marie Rainey	Vienna, VA
	Melissa Erin Reynolds	Wallingford, CT
	Kristen Kathleen Rice	Raleigh
	Sean Derek Rivenbark	Roanoke, VA
	Brian Clarence Robinson	Charlotte
*	Michaela Ambrogynne Robinson	Hartford, CT
	Jill Laurich Rushing	Jacksonville, FL
	Esther Leigh Sanders	Elizabeth City
	Travis Rolen Simmons	Albertson
	Runijana Bal Singh	Charlotte
	Sherrod Brown Sisco	Pensacola, FL
	Carlton Brockwell Slagle	Black Mountain
**	William Russel Summers	Fredericksburg, VA
	Tarkeysia Devette Sutton	Morehead City
	Edwanna Shaneen Tabb	Smithfield
	Crissie RONALDA Taylor	Greenville
	Tara Denise Underwood	Jamestown
	Geoffrey Scott Vicek	Apex
	Shannon Courtney Weil	Goldsboro
	Christopher Thomas Young	Burlington
+	Sarah Ellen Yount	Morganton

BACHELOR OF ARTS IN ENGLISH

Degrees Conferred June 26, 1998

*	Mary Harper Best	Raleigh
	Nicole Susan Bowman	Zebulon
	Fritts Thomas Causby	Greensboro
**	Delores Crocker Critcher	Henderson
	Rebecca Davis Felton	New Windsor, MD
P	Robin Lynn Morlock	Brookfield, CT

P Awarded Posthumously

LaKeisha Rena Parker Raleigh

Degrees Conferred August 11, 1998

Mardrell Antionette Barnes Raleigh
 *** Jeremy Todd Cooper Raleigh
 Sheri Lenise Golden Winston-Salem
 Liane Kasparian Raleigh
 David James Mueller Raleigh
 Amneris Solano Fairbanks, AK
 Rudy Lindsey Stevens Castle Hayne

Degrees To Be Conferred December 16, 1998

John Edward Anderson Raleigh
 Edwin Neal Bateman III Hickory
 Marsha Lee Baxter Rocky Mount
 *** Jan Camille Bridges Raleigh
 Angela De La Rosa Byrd Raleigh
 Sharico Lynchelle Byrd Creedmoor
 ** Dana Kathleen Calistri Syracuse, NY
 Thomas Mark Casterlin Raleigh
 Steven Allen Clodfelter Wallburg
 Erica Cooper Aurora
 Jason Scott Day Charlotte
 Robert Victor DeFrancis Raleigh
 Danielle Marie Donovan Ramsey, NJ
 H Erin Elizabeth Dough Manteo
 Jayme Elizabeth Flood Mount Airy, MD
 * Jennifer Lynn Galioto Cary
 *** Hannah Godard Hamilton Raleigh
 Jobina Antoinette Harris Charlotte
 Stephanie Lynn Harris Lewsville
 *** Samantha Heather Hartford Chapel Hill
 Kristin Lee Hirschfeld Greensboro
 Vicki Nicole Hoglen Asheville
 Shannon Demona Jones Norfolk, VA
 Elizabeth Dunlap King Wilmington
 Melissa Katherine Lassiter Salisbury
 Laura Anne Logsdon Charlotte
 * Jennifer Lynn Cary
 Margaret Paige Mazach Norfolk, VA
 Leslie Dawn McDevitt Rocky Mount
 Elizabeth Whitney McDonald Carthage
 Jon Paul Miller Cary
 HS Aurelia Gabrielle Mullins Raleigh
 Janna Leon Norman Sneads Ferry
 ** Athena Rose Osborne Raleigh
 Christina Lyn Parsons Shelby
 April Caryn Quincoses Kernersville
 Amy Lynn Rinaldi Durham

+	Patrick McQuown Roberson	Raleigh
	Gretchen Elizabeth Rorie	Wadesboro
	Maura Anne Slattery	Cranford, NJ
H***	Rebecca Ann Starmer	Lillington
	Corey Benson Thomas	Rockingham
	Teresa Maria Williams	New Bern
	James Edward Winfrey, Jr.	Asheville

BACHELOR OF ARTS IN FRENCH

Degrees To Be Conferred December 16, 1998

**	Denise Diana Arditti	Hickory
	Robin Eason Hooper	Raleigh

BACHELOR OF ARTS IN HISTORY

Degrees Conferred June 26, 1998

	Sean Christopher Binns	Raleigh
	Christopher James Keegan	Jacksonville
	Matthew Curt Porrazzo	Apex
	Charles Lawrence Stout III	Asheboro

Degrees Conferred August 11, 1998

	Ayona Fatina Johnson	Hope Mills
	Edward Benjamin Perrou, Jr.	Drexel

Degrees To Be Conferred December 16, 1998

	Virginia Pleasants Brake	Charlotte
	Roger Jason Carmichael	Roxboro
	Tiffany Michelle Cox	Trenton
*	William David Davis	Vienna, VA
	Ashley Brent Ennis	Benson
	James Barrett Fish	Willow Spring
	Valoree Haven Freeman	Greensboro
	George William Gatling	Charlotte
	James Edward Gunter	Sophia
	Randall Devon Haddock	Trenton
	Daniel Eric Harris	New York City, NY
**	Geoffrey Treymayne Hodder	Raleigh
	David Lee Hunt	Clinton
	Galen Christopher Joonu Little	Rocky Mount
**	Jennifer Lynne Maloney	Elmira, NY
	Rebecca Simpson Matta	Saint Petersburg, FL
	Cynthia Dianne Meunier	Hickory
	David Houston Michael	Davidson
	Serena May Mika	Spring Lake
	William David Price	Durham
*	Hannah Rains	Raleigh

	Jason Francis Reischel	Candler
**	Randal William Roberts	Morrill, WI
	Jonathan David Rountree	Raleigh
***	Jason Scott Rucienski	Washington
	Richard Orlando Scarborough	Manteo
	Alison Elaina Schmid	Raleigh
	Stephen Brent Snowden	Jacksonville
	Patrick Henry Winston Todd	Raleigh
	John Ashley Tuttle	Winston-Salem
	Michelle Leigh Vohs	Greensboro
	Michael Ryan Wescott	Bolivia

BACHELOR OF ARTS IN MULTIDISCIPLINARY STUDIES

Degrees Conferred June 26, 1998

	Percell Le'Andre Davis	Hobgood
	Derek William Matthews	Pittsford, NY

Degrees Conferred August 11, 1998

	Jonathan Darwin Hairr	Fayetteville
	Collins Danielle Owens	Sanford
	James Jarvis Taylor	Raleigh

Degrees To Be Conferred December 16, 1998

	Marilyn Kirkpatrick Aldridge	Garner
S+***	Samuel Thomas Barron	Raleigh
+***	Kendra Dee Cover	Clemson, SC
H+**	Erin Linnea Dodd	Hickory
	Antonio Maurice Harris	Raleigh
+	Marcela Christina Musgrove	Pembroke
	Michael Paul Parsons	Clinton
*	Spencer Parris Phillips	Roxboro
	Timothy Farrar Shaw	Charlotte
	Kambriana Michelle White	Glendale, CA

BACHELOR OF SCIENCE IN MULTIDISCIPLINARY STUDIES

Degrees To Be Conferred December 16, 1998

S+***	Laura Erin England	Raleigh
	Roderick Tyrone Spearman	Wilmington

BACHELOR OF ARTS IN PHILOSOPHY

Degrees To Be Conferred December 16, 1998

***	Mary Lora Elder	Beech Mountain
	Clifford Michael King	Pilot Mountain
***	John Paul Niffenegger	Cary

BACHELOR OF ARTS IN POLITICAL SCIENCE

Degrees Conferred June 26, 1998

Michael Ross Bengtson	Greensboro
Nickolaus Ryan Dutka	Mansfield, OH
Scott Alexander Greathouse	Fayetteville
* Danielle Kara Greco	Brecksville, OH
Edmund Ferris Hickey IV	Chapel Hill
James Kevin Jackson	Roanoke Rapids
Brad Patrick McCloskey	Raleigh
Kevin Wayne Russell	Greensboro
Brandon Russell Sauls	Clayton

Degrees Conferred August 11, 1998

Charles Michael Bowen	Fayetteville
Robert Edward Guthrie	Gloucester
Edward Keith Johnson	Sanford, ND
Darren Christian LeRose	Ringwood, NJ
Kimberly Ann Nash	Greensboro
Matthew John Serrano	Norfolk, VA

Degrees To Be Conferred December 16, 1998

Elizabeth Alden Bass	Mocksville
Kevin Adaryl Blue	Winston-Salem
Paul Todd Casey	Raleigh
Garret John Chapman	Zebulon
Monica Nicole DeMaras	Charlotte
June Louise Elliott	Morrisville
Kelly Ann Enright	Dobbs Ferry, NY
Jerelle Lee Gainey	Clayton
Alexander Matthew Goins	Mount Airy
Mark Henry Herbert	Canvey Island, England
* Bernadette Hughes	Raleigh
David Noble Johnston	Denver, CO
Joseph Brian King	Garner
Jakub Martin Kreuter	Gaithersburg, MD
Tarona Amber Marshall	Mount Airy
Bridget Maureen McGowan	Williamsburg, VA
S* Amanda Elizabeth Morris	Durham
Natalie Maria Ostroski	Kernersville
Lateef Rashaan Patterson	Atlantic City, NJ
+ Jeffrey Michael Roberts	Durham
Tara Ruanda-Reid	Asheville
Philip Ryan Spragins	Littleton
Heather Leigh-Ann Stewart	Gastonia
Robert Lee Teasley	Chicago, IL
** William James Terry	Gastonia

Christopher Allen Turnage	Louisburg
Pamela Love White	Brevard
* Laura Anne Wiggs	Garner
Bryan Douglas Wight	Asheville
Bruce Edward Williams	Raleigh
Daniel Lanford Williams	Clemson, SC

BACHELOR OF SCIENCE IN POLITICAL SCIENCE

Degrees To Be Conferred December 16, 1998

Amy Michelle Long	Apex
Matthew Ray Pressley	Mooreboro

BACHELOR OF ARTS IN RELIGIOUS STUDIES

Degrees Conferred June 26, 1998

Randy Warren King	Charlotte
Debbie Ann Motley	Garner

Degree Conferred August 11, 1998

Shane McKay Roberts	Landis
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Degrees To Be Conferred December 16, 1998

Sarah Eve Collins	Hudson
Daniel Dukhee Kang	Fayetteville
Jefferie Keith Pflaumbaum	Candler
Robert Daniel Rozier	Raleigh

BACHELOR OF ARTS IN SOCIOLOGY

Degrees Conferred June 26, 1998

Jodi Michelle Bazemore	Raleigh
John Stewart Grant	Blacksburg, VA
H** Terrence Stanton McShea	Cary
William Sidney Thames II	Raleigh
Bryson Earl Trogdon, Jr.	Greensboro

Degrees Conferred August 11, 1998

Rick Allyn Biever	Roxboro
Micah John Bittman	Sarasota, FL
Jason Ashley Brown	Richlands
Anna Maria Chamis	Winston-Salem
** Todd Joseph Gilchrist	Aurora, CO
Justin Robert Jones	Milan, TN
Joshua Kenneth Stephen Kearney	Middlebury, CT
Caroline Varino Molinard	Fuquay-Varina

Joshua Collin Panter	Fayetteville
Leroy Al Pinkins	Camilla, GA

Degrees To Be Conferred December 16, 1998

Tracie Dawn Alford	Creedmoor
Elijah Darnell Austin	Attapulcus, GA
Nicole Suzanne Betterton	Roxboro
Christine Lani Bischoff	Raleigh
Ellyn Clare Casey	Alexandria, VA
Ronald Lee Collier	Raleigh
Krystal Dawn Craven	Lexington
** James Howell Quin Davis	Raleigh
Matthew Robert Harrold	Boynton Beach, FL
Billy Thompson Hicks	Candor
Brian Edward Johnson	Rocky Mount
Allison Renee Martin	Whitsett
Richard Benjamin Maxim	Fayetteville
Joshua Brian McLaurin	Wadesboro
Matthew Thomas McMahan	Raleigh
S Allyson Lynn Melvin	Fayetteville
Allison Marie Papa	Greensboro
Stephanie Joan Pontello	Poughkeepsie, NY
Kellie Ann Poole	Charlotte
Angela Clark Ramsey	Jacksonville
Karen Elizabeth Richardson	Summerville, SC
* Amy Elaine Roberson	Greensboro
+ Jeffrey Michael Roberts	Durham
Tracy Ann Smith	Kernersville
Jonathan Alan Styers	Clemmons
Gregory Sam Vastis	Charlotte
Sean Jermaine Weathers	Broadway
Tammy Jean Winstead	Middlesex
Damon Rael Wyche	Camden, NJ

BACHELOR OF ARTS IN SPANISH LANGUAGE AND LITERATURE

Degrees Conferred June 26, 1998

Amy Cornelia Boyd	Waldorf, MD
Ashley Elizabeth Dozier	Raleigh
Miguel Alberto Ramirez-Del Toro	Durham
Jenny Diane Sousk	Burke, VA

Degrees To Be Conferred December 16, 1998

** Stephani Lynn Faw Aycock	Hays
Alane Quebral Basco	Havelock
Seyma Doris Bennett	Raleigh
* Terry Michael Hart	Siler City
Amanda Jean Ireland	Advance
S+** Jill McVey	Staten Island, NY

Ryland Hilliard Shaw III	Kinston
Holly Miciotto Slate	Raleigh
*** Kristie Beth Stankiewicz	Orlando, FL
Charles Leslie Wright IV	Raleigh

BACHELOR OF SOCIAL WORK

Degree Conferred August 11, 1998

Konstantina Nicholaou Konidaris	Kernersville
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Degrees To Be Conferred December 16, 1998

* Jennifer Noel Audette	Clifton Park, NY
Donna Eve Calton	Raleigh
Kelly René Davis	Clayton
Jennifer Lynn Durrant	Cary
Kathleen Mary Farrel	Duluth, GA
Alison Donahue Ferguson	Charlotte
Lorraine Georgette Hayden	Milford, PA
Yoon Kyong Im	Raleigh
** Alecia Caroline Hope Johnson	Elizabethtown
** Bryna Tobí Kidd	Cary
Sara Elizabeth Larrick	Jamestown
** Michael Steven Laslie	Carrboro
* Heather Lorrain Norton	Raleigh
Kelly Sofield Overton	Raleigh
Jodi Paige Pearce	Henderson
Joseph Francis Smith	Raleigh
Thea Marie Williams	Apex
*** Boleyn Hamilton Willis	Durham
* Amanda Patricia Wilson	Eden

College of Management

BACHELOR OF ARTS IN ACCOUNTING

Degrees To Be Conferred December 16, 1998

Benjamin Lewis Barnes	Raleigh
Amanda Ray Komegay	Hertford



BACHELOR OF SCIENCE IN ACCOUNTING

Degrees Conferred June 26, 1998

**	Nea Wan Condosta	Apex
	Kevin Donald Howard	Clinton
**	Cheryl Hinnant Jones	Benson
	Stephen Howard Judge	Rocky Mount
	Erik John Loesch	Charlotte
	Thaddeous Charles Miller	Raleigh
	Bradley Simone Pace	Arlington, VA
*	Jason Thomas Stephens	Fuquay-Varina
	Jennifer Rebecca Whaley	New Bern

Degrees Conferred August 11, 1998

**	Cynthia Jean Belvin	Raleigh
***	Carole Lee Bringe	Raleigh
*	Stephen Alexander Carrasco	Kinston
	Juana Cogdell	Aberdeen, MD
	Michele Nicole Crowder	Baltimore, MD
	Kimberly Christine Lance	Franklinton
	Roman Christopher Norrod	Sandy Ridge

Degrees To Be Conferred December 16, 1998

	Anna Reed Absher	Raleigh
	Marcia Lynnette Barber-Gooch	Durham
	Brian Dale Bradford	Asheville
	Cormekki Lavon Brown	Cove City
*	Jill Thomas Bruffey	Broadway
***	Andrea Dawn Chapman	Zebulon
	Darrin Ray Dakin	Southern Pines
*	Jennifer Carol Dugan	Uxbridge, MA
	Abdulrahman Hicham El-Sbayti	Raleigh
	Allah Koran Funderburk	Charlotte
	Jonathan Davis Geddie	Elizabeth City
***	Janet Norwood Green	Oxford
**	Allison Leigh Hargrave	Nashville
*	Laura Lea Hensley	Mount Airy
	Kenneth Robert Hingos	Forked River, NJ
	Christina Reneé Hodge	Raleigh
	Angela Holloway Holbrook	Lillington
**	Daniel Scott Hughes	Goldsboro
	Marty Joseph Hutchens	Mount Airy
*	Daniel Charles Ketola	Franklin
***	Charles John Koch	Toms River, NJ
	James Alfred Lowe, Jr.	Reidsville
	Yvette Anita Mayfield	Raleigh
	Tony Kenard McCoy	Winston-Salem
	Kristen Ann McKeon	Binghamton, NY
+	Melody Dawn Murray	Fayetteville

+Co-major
*Cum Laude

H Honors Program
**Magna Cum Laude

S University Scholars Program
***Summa Cum Laude

+	Jeffrey Paul Osborne	Hickory
	David Andrew Page	Wendell
	Mélanie Laura Paul	Raleigh
	Olivia Ann Proctor	Charlotte
	Milenda Cathrin Ritchie	Lexington
	Edon Terrelle Rodgers	Raleigh
	Matthew Todd Schweikher	Charlotte
	Charles Lyon Stubbs	Durham
	Jason Corey Swicegood	Edenton
	Tom Cuong Ta	Raleigh
**	Minh Truong	Hickory
	Ryan Lance Walton	Whitsett
	Li Wei	Monterey Park, CA
	Matthew Petersen Whitley	Raleigh
	Karen Latrisia Williamson	Raleigh

BACHELOR OF ARTS IN BUSINESS MANAGEMENT

Degrees Conferred June 26, 1998

Elisabeth Kreszentia Baumann	Apex
Jeffry Holmes	Hyattsville, MD

Degrees Conferred August 11, 1998

Bickett Douglas Fort	Raleigh
Jooran Park	Charlotte
Charles Robert Reading	Hickory
Yolanda Gaye Taylor	Fayetteville

Degrees To Be Conferred December 16, 1998

Jean Ratica McCullough	Raleigh
Jeremy Randall Tabery	Raleigh

BACHELOR OF SCIENCE IN BUSINESS MANAGEMENT

Degrees Conferred June 26, 1998

**	John Huske Anderson, Jr.	Fayetteville
	Michael Richard Bestafka	Staten Island, NY
***	Krystyna Wegrzyn Bielawska	Wroclaw, Poland
	Joshua Allen Bolden	Matthews
	Shane Duncan Brackin	Providence
	Jill Renee Braun	Shelby
	Brian Patrick Carney	Raleigh
	Matthew Brian Eaton	Durham
	Scott James Frahm	Greensboro
**	James Christopher Gabriel	Rutherfordton
	Steven James Harlass	Wichita Falls, TX
	Melissa Marie Hein	Cary
	Christopher Michael Johnson	Charlotte

***	Stefanie Barbara Lang	Cary
	George Yuriy Manyak	Matthews
**	Kimberly Ann Marconi	Clayton
	Rebecca Anne Newman	Raleigh
	Michael Stephen Novak	Gastonia
	Parul Dhananjay Patel	Cary
	Constance Arlene Poteat	Cedar Grove
*	Jennifer Whitten Richards	Raleigh
	Glenda Layton Rogers	Raleigh
*	Patricia Ann Ruf	Mumford, NY
	Melissa Jean Swanner	Edenton
	Matthew Scott Varnell	Rocky Mount
	Laura Wynne	San Diego, CA

Degrees Conferred August 11, 1998

	Steven Duane Abee	Charlotte
	Robert Todd Albiez	Beaufort
	Matthew William Bagley	Charlotte
	Candy Kaye Boykin	Wendell
	Christopher Bruce Brown	Raleigh
	Kenneth Sherrod Capps II	Wake Forest
	Justin Matthew Cashman	Raleigh
	Brian Charles Croom	Concord
	Roger Kirk Davis	Garner
	Mary Belinda Hendrick	Wilmington
	Matthew David Hilliard	Wilmington
	Rex Cameron Hinesley	Raleigh
	Kevin David Hockaday	Raleigh
	Benjamin Lloyd Jackson	Wilmington
	Aamir Kamal Khan	Dehradun, India
	Bryan Lee King	Weaverville
	Jason Bradford Laws	Charlotte
	Kelley Baker McKean	Apex
	Thomas Andrew McLamb	Dunn
	Brad Alan Mitchell	Smithfield
	Cherilyn Anne Moore	Wake Forest
***	Kevin James Muterspaugh	Cary
	Jon Marc Overfelt	Cary
	James Darrell Parrott	Forest Park, GA
	Elizabeth Senia Pinoniemi	Raleigh
	Tamalika Devonnie Ramsey	Pittsboro
	Andrew Robert Richards	Garner
	Tabitha Shonnetté Smith	Goldsboro
	Samantha Ivy Turner	Miami, FL
*	Frank Wayne Waters	Pantego

Degrees To Be Conferred December 16, 1998

	Philip Edwards Abbott	Durham
*	Laura Anne Abernathy	Matthews
	Shannon Dana Adams	Suffolk, VA

	Gina Lenae Albano	Raleigh
**	Aneis Marie Andreoli	Raleigh
**	Stephen Marshall Antosek	Salisbury
	Robert David Baker	Nashville
	Dale Christian Bayless	Garner
	William Andrew Beard	Davidson
	Michael Thomas Bell	Kings Mountain
*	Danielle Marie Benetz	Chalfont, PA
*	Frank Maurice Benzaquen	Raleigh
	John Wesley Berry	Rocky Mount
	Kelley Michelle Berry	Engelhard
	David Lee Bolick	High Point
	Thomas James Botelis	Bladenboro
	Summer Leigh Bowen	Raleigh
	Adam James Bradley	Buffalo, NY
	Rachel Anne Brenizer	Cincinnati, OH
	Adam Arwood Bryn	Raleigh
	Laurie Ann Bullock	Clayton
	Delbert Tomas Bunn	Raleigh
	Eric DeShawn Burns	Fayetteville
	Cheryll Elizabeth Campbell	Lillington
	Wesley Stuart Campbell	Elizabethtown
**	Michael Patrick Campos	Fayetteville
	Kimberly Lassiter Canady	Four Oaks
	Cassandra Renee Cannon	Reidsville
	Donald Brandon Case	Madison
	Justin Turner Caspar	Winston-Salem
	Mark Douglas Cherry	Goldsboro
	Austin McNeil Chestnut	Raleigh
	Holly Elizabeth Clarke	Durham
*	Peyton Benfield Cline	Raleigh
	William Benjamin Cobb	Pinetops
	Jeffrey Alan Conken	Pittsboro
	Robert John Consoli, Jr.	Charlotte
	Parker Thomas Cooper	Raleigh
	Michelle Barefoot Corbett	Benson
	Christopher Coy	Highland, NY
	Jason Stanly Cunningham	Raleigh
*	Grey Adam Davis	Greensboro
	Mason Russell Davis	Kinston
	Shawn William Densmore	Raleigh
	Jennifer Lee Der	Wendell
	Melissa Llewellyn Dickerson	Charlotte
	Reneé Christine DiSorbo	Garner
	Murray Odom Duggins, Jr.	Fayetteville
	Christina Lynnette Duke	Youngsville
	Rebecca Barwick Elmore	Kinston
	Jennifer Dawn Esbenshade	Raleigh
	Richard T. Everett	Rocky Mount
	Matthew David Favreau	Charlotte
	Katherine Carmen Finger	Asheville
	Scott Montgomery Flora	Raleigh

	Christopher Keith Flouhouse	Charlotte
	Thomas Carl Flynn III	Atlantic Beach
	Kevin Wayne Frazier	Hampton, VA
**	Tim David Frost	Raleigh
*	Patricia Michelle Gaffney	Raleigh
	Kevin Randall Gobble	Elon College
	Cynthia Kay Godwin	Godwin
	Heather Lee Graham	Yadkinville
*	Jarret William Graham	Troutman
+	Michelle Lee Grainger	Raleigh
	Amy Louise Gray	Robersonville
	Jeffrey Sean Greene	Charlotte
	Paula Lynn Griffin	Raleigh
	William Shepard Haggerty	Rocky Mount
	Jason Michael Haley	Fayetteville
	Bernel Ernie Hall, Jr.	Jacksonville
	Amy Michelle Hampton	Salisbury
*	Daniel Sterrett Harrison	Raleigh
	Ricky Jan Heath	Dudley
	Carman Theodore Hicks II	Newport News, VA
	Brad Stephen Higdon	Winston-Salem
	Amanda Leigh Hileman	Matthews
	Justin Edson Hinkle	Mooreville
	Kerry Lynn Hollowell	Edenton
	Bradley Stephen Holton	Raleigh
	Victoria Thoai Hua	Raleigh
	Jonathan David Huddle	Salisbury
	William McSwain Hyatt	Winston-Salem
	Amy Beth Jelovsek	Durham
	Jeffrey Spencer Johnson	Charlotte
	Matthew Brandon Johnson	Troy
	William Todd Johnson	Martinsville, VA
*	Heather Luclaire Jones	High Point
	John Chadwick Jones	Fuquay-Varina
	Darren Douglas Kearns	Raleigh
	Robert David Kirkpatrick	Pittsburgh, PA
	Scott Corey Kramer	Damascus, MD
*	Lisa Alison Kuhn	Lumberton
	Jennifer Pamela Lakas	Charlotte
	Erica Anne Lamb	Lumberton
	Danielle Leigh Lepore	Fairmont
	Christa Katrina Lewis	Wendell
	Kesha Anna Liles	Wilson
	Cynthia Helen Lindsay	Holly Springs
S***	Adrenna Lane Locklear	Rennert
	Jason Charles Lott	Clemmons
	Michael James Lotterhos	Greenville
	Christine Denise Love	Winnabow
	Amy Rebekah Maddox	Sanford
	Brian Louis Maglione	Washington Township, NJ
*	Elizabeth Marie Mark	Livonia, MI
	Leon Ku Marshall	Charlotte

	Kara Marie Martin	Winston-Salem
	Allison Jane Matthews	Raleigh
	Andrew Daniel Mayse	Clemmons
	Nacole Kay McMahon	Granite Quarry
	Amanda Anne McPherson	Raleigh
	Niki Allison McQueen	Garner
**	Christen Frances Marie Medler	Brockport, NY
	Riddhi Tatsat Mehta	Charlotte
	Andrea Nicole Melvin	Fayetteville
*	Megan Redmond Miedema	Wilmington
	Matthew Todd Miller	Marion
	Ronald Steven Mitchell	Youngsville
	Alexander Zachariah Monroe	Charlotte
	Julie Jones Morgan	Henderson
	Chauronda Katrice Morrison	Rocky Mount
	Jill Suzanne Morton	Raleigh
**	Ted Richard Murphy, Jr.	Rocky Mount
+	Melody Dawn Murray	Fayetteville
	Roisin Siobhan Neely	Raleigh
	Amy June Nelson	Mooreville
	Thanh Trang Nguyen	Fayetteville
	Richard Adam Norris	Four Oaks
	Brian Sandlin Nowell	Morehead City
	Christian Ikenna Onwuteaica	Enusa, Nigeria
+	Jeffrey Paul Osborne	Hickory
	Stephen Andrew Owens	Safety Harbor, FL
	Ankur Kirit Parekh	Raleigh
**	Melanie Frances Parham	Henderson
	Ivey Lynn Parker	Coats
	Chad Franklin Parrish	Wilson
*	Michael Carl Parsons	Greensboro
	Sundip Kantilal Patel	Hickory
	Gregory John Paterson	Winston-Salem
	Marguerite Delores Pearson	Raleigh
	Adam Salvatore Peterson	Somers Point, NJ
	Simone Pinzauti	Cary
	Brian Philip Pitchford	Concord
	Stephanie Lynne Poole	Raleigh
	Iris Emanuelle Preissing	Raleigh
	Subin Punnoose	Kerala, India
	Spencer David Qualls	Duck
	Justin Porter Query	Lenoir
	Carey Ronell Raynor	Monticello, NY
	Jason Alexander Rehm	Wake Forest
	Sally Swarm Resnik	Cary
	Willard Joseph Riggle	Killeen, TX
	Matthew Ross Roberson	Burlington
	Tara Darlene Satterwhite	Henderson
**	Regina Marie Schopper	Worcester, MA
	Michelle René Sedlak	Wake Forest
	Aylin Aysel Sener	Cary
	Arpit Ashvin Shah	Spartanburg, SC

	Rishabh Ramesh Sheth	Thomasville
	Wilson Huxford Simmons	Greensboro
*	Jessica Anne Simo	Great Barrington, MA
	Aaron Nathaniel Singh	Rocky Mount
	Ajit Pratap Singh	Cary
	Robert William Slusser	Charlotte
	Caroline Amy Smith	Durham
	Carrie Dawn Smith	Charlotte
	Tanika Malina Sneed	Franklinton
	Gregory Johnson Stahl	Waynesville
*	David Ryan Stark	Knightdale
	Melissa Sue Stoss	Hickory
	Catherine Blair Sutton	Fayetteville
	Brian Christopher Tart	Elizabethtown
	Brent Alexander Thompson	Fairfax, VA
	John David Titchener III	Raleigh
	Frank Toan Trinh	Raleigh
	Brian Walter Turner	Kingston, NY
	Tiffany Lynn Turner	Greensboro
	Brian Joseph Tutich	Greensburg, PA
	Karen Ngozi Uzoigwe	Waterloo, IA
*	Erin Reed Vickers	Salisbury
	Eva Waithera	Nairobi, Kenya
***	Conny Waltemath	Jacksonville
	John Tyler Welch III	Reidsville
	Leslie Dean White	Clayton
	Stacey Shamell White	Atlanta, GA
	Theresa Louise White	Charlotte
	William Robert Wiggins II	Raleigh
	Dionne Williams	Raleigh
	Edna James Williams	Mooresville
*	Sharon Telisia Williamson	Raleigh
	Weldon Wray Williford, Jr.	Fremont
	Marcus Monroe Wilson	Henderson
*	Cary Nicholas Yacabucci	Winston-Salem
+	Sarah Ellen Yount	Morganton

BACHELOR OF ARTS IN ECONOMICS

Degrees Conferred August 11, 1998

Cesar Arreguin	Monterrey, Mexico
Vincent Rafael Boceta	Madrid, Spain
Brandi Shane Everhart	Burlington
Mona Dina Mohamed	Smithfield
David Henry Wall	Grand Forks, ND

Degrees To Be Conferred December 16, 1998

Stephen Randal Campbell	Raleigh
Melissa Dawn Galloway	Winston-Salem
Andrew Jamieson Gregory, Jr.	Raleigh

Jennifer Marie Hardee	Winnabow
Charles Jerome Parks	Raleigh
Margaret Nicole Porter	Raleigh
Samuel Wright Starling III	Greensboro

BACHELOR OF SCIENCE IN ECONOMICS

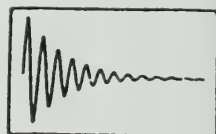
Degree Conferred June 26, 1998

Rebecca Joan Thomson	Cary
----------------------------	------

Degrees To Be Conferred December 16, 1998

Jay Hawkins Bibby	Franklinton
Barry Alexander Crenshaw	Morrisville
+ Andrew Philip Jay	Alajuela, Costa Rica
Michael Charles Kalavsky	Raleigh
James Paul Wilson	Greensboro
+*** Loreta Vasiliauskaite Wilson	Raleigh

College of Physical and Mathematical Sciences



BACHELOR OF SCIENCE IN APPLIED MATHEMATICS

Degrees To Be Conferred December 16, 1998

Allyson Nicole Austin	Burlington
Michelle Jean Cobb	Windsor
Misty Annette Greer	West Jefferson
Carolyn Lamar Holloway	North Augusta, SC
Steven Carlos Jones	Burlington
+ Marcela Christina Musgrove	Pembroke
+ T. Jacob Nicholson	Phoenixville, PA
Lance Mason Robinson	Charlotte
Vandoria Renee Walker	Burlington

BACHELOR OF ARTS IN CHEMISTRY

Degree Conferred June 26, 1998

** Todd Nathan Grosshandler	Raleigh
-----------------------------------	---------

Degrees Conferred August 11, 1998

+	Kiernan Thomas DeAngelis	Durham
+***	Joseph Scott Henderson	Wallace
	Sarah Ellen Jones	Raleigh
	Che Hyon Moon	Raleigh
+	David Michael Pressley	Hendersonville
+	Shivani Suresh Shah	Gallup, NM
	Edison Norwood Watson	Raleigh

Degrees To Be Conferred December 16, 1998

+	Danielle Teresa Bach	Raleigh
S+*	Salam Ghazi Bidwan	Wilmington
+	Chad Stafford Branch	Hopewell, VA
+	Matthew Martin Herron	Greenville, SC
+*	Kelly Ann Hershberger	Roanoke Rapids
	Michael Lawrence Howe	Wilson
	Quinnzel Lateck McMillian	Whiteville
+*	Staci Raquel McNair	Halifax
+	Jennifer Della McWilliams	Grifton
*	Sean Warren Mortenson	Charlotte
+	Daniel Mottola	Wilmington
	Daniel Joseph Schwartz	Charlotte
+**	William Ashley Sparks	Roanoke Rapids
*	James Francis Storella	Charlotte
+	Daniera Zenobia Wilson	Charlotte
	Tae Hyop Yi	Fayetteville

BACHELOR OF SCIENCE IN CHEMISTRY

Degrees To Be Conferred December 16, 1998

	Nicolle Lynn Babocsi	Arden
	Micheal Van Shonn Barnett	Gastonia
S+**	Robert Matthew Bereman	Apex
***	Sherri Suzanne Brown	Winston-Salem
***	Jennifer Lea Catanzaro	Long Beach
	Patrick Allen Graham	Fayetteville
	Janine Louise Hamlin	Forest City
	Maurice Dashon Mackie	Lauringburg
H**	Viola Sherice Nivens	Charlotte
**	Jerry Michael Overton	Raleigh
	Melvin Gray Whitehead	Rocky Mount

BACHELOR OF ARTS IN ENVIRONMENTAL SCIENCES

Degree To Be Conferred December 16, 1998

+	Khristine Marie Westfall	Raleigh
---	--------------------------	---------

+Co-major
*Cum Laude

H Honors Program
**Magna Cum Laude

S University Scholars Program
***Summa Cum Laude

BACHELOR OF ARTS IN GEOLOGY

Degree To Be Conferred December 16, 1998

Mark Allen Townley Greer, SC

BACHELOR OF SCIENCE IN GEOLOGY

Degree Conferred August 11, 1998

Hunter Johnson Manley Clinton

BACHELOR OF SCIENCE IN MATHEMATICS

Degrees Conferred June 26, 1998

Spencer Pell Austin Knotts Island

H** Ryan Michael Czerwicz Raleigh

** Mary Elizabeth Lassiter Trenton

Degrees To Be Conferred December 16, 1998

*** Sarah Jane Haldeman Portland, OR

*** Amanda Cowles Hudson Burlington

Jack Robinette Hunter Raleigh

Bonnie Faye Shamlin Cary

Emily Elizabeth White Lexington

+* Daniel Scott Wilkins Garner

BACHELOR OF SCIENCE IN METEOROLOGY

Degree Conferred June 26, 1998

Brent Adrien Levi Zirconia

Degree Conferred August 11, 1998

Frank James Pereira Hagerstown, MD

Degrees To Be Conferred December 16, 1998

H*** Timothy Reid Lowery Monroe

Kevin Jude Slover Raleigh

Brian Holt Stephens Cape Carteret

BACHELOR OF SCIENCE IN NATURAL RESOURCES

Degree Conferred June 26, 1998

Krissina Diane Briggs Holly Springs

Degrees To Be Conferred December 16, 1998

Leslie Daune Armstrong	Rocky Mount
Brian Shane Carpenter	Morehead City
** Marina Walchshofer Coppedge	Clayton
Anthony Russell Damar	Reidsville
Janet Ashley Humphrey	Richlands
Matthew James Malone	Raleigh
Christopher Ryan Marriott	Mooresville
HS*** Jennifer Rose Michael	Julian
Joel Edward Stinson	Beaufort
Keith Ryan Wagoner	McLeansville
Clifton Warren Whitfield	Kinston

BACHELOR OF SCIENCE IN PHYSICS

Degree Conferred June 26, 1998

Jeffrey Thomas Mullen	Louisville, KY
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Degree To Be Conferred December 16, 1998

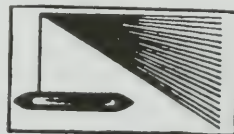
John William Grant	Kernersville
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BACHELOR OF SCIENCE IN STATISTICS

Degrees To Be Conferred December 16, 1998

James Wilson Beattie	Canal Zone, Panama
* Donald Lamar Chapman	Wallburg
Deborah Lynn Nicholas	Raleigh
Michael Stephen Vorburger	Baldwin, NY
+ Khristine Marie Westfall	Raleigh
Matthew James Westlake	Wilmington
+* Daniel Scott Wilkins	Garner

College of Textiles



BACHELOR OF SCIENCE IN TEXTILE ENGINEERING

Jointly administered by the College of Textiles and the College of Engineering.

Degrees To Be Conferred December 16, 1998

** Zeb Wilkes Atkinson	Greenville
Bradley Hamilton Faucette	Burlington

Alejandro Martin Rossato	Burlington
* Benjamin David Wiese	Valdese

BACHELOR OF SCIENCE IN TEXTILE AND APPAREL MANAGEMENT

Degrees Conferred June 26, 1998

Gregory Max Combs	Shelby
+*** Kendra Dee Cover	Clemson, SC
Thomas Jason Grier	Shelby
Christopher Todd Kaldon	Pittsburgh, PA

Degrees Conferred August 11, 1998

Casey Eric Rogers	Belmont
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Degrees To Be Conferred December 16, 1998

Justin Lee Akers	Fayetteville
* Dawn Jessica Auerbach	Fort Lauderdale, FL
** James Harper Barnhardt III	Charlotte
Malcolm Britain Blankenship	Salisbury
Jonathan Bruce Boney	Burlington
Scott Michael Borgert	Charlotte
Shelley Hayes Bumgarner	Gastonia
Gregory Vincent Cherry, Jr.	Gastonia
Luretha Bennett Coon	Greensboro
Deirdre Claire Deignan	Greensboro
H+** Erin Linnea Dodd	Hickory
Mark Davis Eagle	Charlotte
Matthew Frank Evans	Salisbury
Roger Alan Greene	Greensboro
Matthew Brian Griffith	Burlington
Holly Trisha Hamilton	Charlotte
* Angela Irene Holshouser	Connelly Springs
Tiffany Jean Johnson	Ooltewah, TN
*** Harriet Stevens Koella	Knoxville, TN
Jason Michael Lewandowski	Winston-Salem
Bridgette Ann Loburk	Raleigh
James Wade Logan	Rutherfordton
*** Kimberly Frances Minturn	Raleigh
Seth Emil Shapiro	Coventry, RI
Christian Chloris Swiers	Wilmington
** Kendra Lynn Taylor	Suffolk, VA
Shea Elizabeth Wade	Wade
Edward Rudolph Warren IV	Wrightsville Beach
Jeremy Joseph Weber	Morehead City
Emily Blair Weddington	Greensboro
Benjamin Fred Wilson	Gastonia
Elizabeth Marie Wilson	Hendersonville

BACHELOR OF SCIENCE IN TEXTILE CHEMISTRY

Degrees Conferred June 26, 1998

- ** Jenny Lynn Boyd East Flat Rock
- * Kristin Lee Campbell Haslett, MI

Degrees Conferred August 11, 1998

- + Omer Zulfiqar Chaudhry Cary
- Dody Henderson Todd Gastonia

Degrees To Be Conferred December 16, 1998

- S+** Robert Matthew Bereman Apex
- David Jay Buffington Mebane
- Reginald Jerome Degraffenreaidt Goldston
- James Patrick Emch Waxhaw
- Matthew Patrick Hamby Bethlehem
- + Matthew Martin Herron Greenville, SC
- *** Melanie Carol Pearce Bear Creek
- ** Jason Timothy Spangler Lincolnton

BACHELOR OF SCIENCE IN TEXTILE MATERIALS SCIENCE

Degrees To Be Conferred December 16, 1998

- Jeffery Scott Smith Jamestown
- Eric Ryan Stewart Lewisville

BACHELOR OF SCIENCE IN TEXTILE TECHNOLOGY

Degree Conferred August 11, 1998

- + Omer Zulfiqar Chaudhry Cary

Degrees To Be Conferred December 16, 1998

- ** Mirza Shahzad Baig Raleigh
- Lewis Cagle Biscoe
- Paul Vernon Fogleman Snow Camp
- *** Marc Adam Greenspoon Orlando, FL
- * Todd Keith Hamilton Gastonia
- Noah Hodsdon Kahn Gastonia
- * Jessica Estelle Kauffman Raleigh
- Paul Edward Long Newton
- Kristie Lavet Peoples Sanford
- *** Walker Pearce Phillips Charlotte
- Xenia Jeannell Pigford Wilmington
- Gwendolyn Jane Schneider Monroe

GRADUATE DEGREES

Master's Degrees



MASTER OF ACCOUNTING

Degrees Conferred August 11, 1998

Shelly Denise Adams	Benson
Christopher Joseph Angelo	Raleigh
Joyita Roy Basu	Cary
Tracey Anne Bullock	Waldorf, MD
Jin Cheng	Hefei, People's Republic of China
Stephen Arthur Davenport	Brevard
Michele Mercedes Gardi	Charlotte
Gladys Latonya Hankins	Boliva
Christopher David Hoh	Glen Gardner, NJ
Marc Eban Katzin	Salisbury
Jennifer Lynn Koch	Toms River, NJ
Amy Bunnell LaCon	Huntington, NY
Shi-Yu Liang	Raleigh
Rhonda Felicia Manuel	Port Arthur, TX
Jeremy David Morris	Hingham, MA
Patricia Jussen Roper	Cary
Zachary Paul Sloane	Mebane
James Michael Thompson	Wilmington
Wei-Chen Tsai	Raleigh

Degree To Be Conferred December 16, 1998

Paul Bradley Faulkner, Jr.	Comfort
----------------------------	---------

MASTER OF AGRICULTURAL AND EXTENSION EDUCATION

Jerry Bennett Simpson	Waxhaw
-----------------------	--------

MASTER OF AGRICULTURE

Degree Conferred August 11, 1998

George Thomas Brooks	Oxford
----------------------	--------

Degree To Be Conferred December 16, 1998

William Gerald Howell	Goldsboro
-----------------------	-----------

MASTER OF ARCHITECTURE

Degrees To Be Conferred December 16, 1998

Scott Henry Allen	Bedford, NH
Brian Abram Baker	Raleigh
William John Hinds, Jr.	Summerville, SC
Yuling Mao	Suzhou, People's Republic of China
Steven Ronald Raike	Raleigh
Vincent Barten Whitehurst	Raleigh

MASTER OF BIOLOGICAL AND AGRICULTURAL ENGINEERING

Degree To Be Conferred December 16, 1998

Louise O'Hara Slate	Bedford, MA
---------------------------	-------------

MASTER OF BIOMATHEMATICS

Degrees Conferred August 11, 1998

Paul David Schliekelman	Raleigh
-------------------------------	---------

MASTER OF CIVIL ENGINEERING

Degrees Conferred August 11, 1998

Karan Krasesindhu	Bangkok, Thailand
Sujay Vijaya Kumar	Cochin, India
Lixin Yu	Raleigh

Degrees To Be Conferred December 16, 1998

Steven Paul Bailey	Roxboro
Chun-Chao Chen	Taichung, Taiwan, Republic of China
Peter Bruce Currie	Raleigh
Amita Kataria	Indore, India
David Scott Levine	Apex
Jahja Yow-Haan Lim	Raleigh
Randy John McDonald	Chapel Hill
Joseph Marshall Moore II	Cary
Mooi Lian Ong	Kuching, Malaysia
Timothy Hugh Padgett	Asheville
Matthew Douglass Robinson	Beaver Falls, PA
Mustafa Bulent Temel	Ankara, Turkey

MASTER OF COMPUTER SCIENCE

Degree Conferred August 11, 1998

Xiaoyong Feng	Yangquan, People's Republic of China
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Degrees To Be Conferred December 16, 1998

Li-Jiuan Chen	Yungho, Taipei
Xuzhou Chen	Cary
Todd andrew Hagstrom	Apex
Carl Patrick Hobson	Wendell
John andrew Jasperse	Raleigh
Zhigang Lian	Taiyuan, Shanxi, People's Republic of China
Weigen Liang	Raleigh
Xingzhong Min	Nanjing, People's Republic of China
Srinivasa Pasula Reddy	Raleigh
Jie Su	Chapel Hill
Jeffrey Scott Webster	Cary
Kulawat Wongsaroj	Nakhonprathom

MASTER OF CROP SCIENCE

Degree To Be Conferred December 16, 1998

Lewis Gaylon Ambrose	Bath
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MASTER OF ECONOMICS

Degree Conferred August 11, 1998

Sadharga Koesbandana	Bogor, Indonesia
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Degrees To Be Conferred December 16, 1998

Ghada Al Homsy	Cary
Chuchun Chien	Taipei, Taiwan, Republic of China
John David Dodrill	Birch River, WV
Jonathan David Mauro	Raleigh
Mark Robert Metcalfe	Boston, MA
Zulal Sogutlu	Raleigh

MASTER OF EDUCATION

Adult and Community College Education

Degree Conferred August 11, 1998

Stacy Michelle Branigan	Radford, VA
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Degrees To Be Conferred December 16, 1998

Marcia Hill Johnson	Sanford
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Counselor Education

Degree Conferred August 11, 1998

Jennifer Nelson Bell	Raleigh
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Degrees To Be Conferred December 16, 1998

Kathleen Louise Fitzgerald	Chapel Hill
Ellen Sue Frank	Bronx, NY

Curriculum and Instruction

Degrees To Be Conferred December 16, 1998

Donna Kay Clelland	Broadway
Angela Thompson Cutlip	Garner
Jenny Rebecca Linkkila	Hampton, CT
Daniel Patrick Pelletier	Chapel Hill
Linda Belotti Schmidt	Kenosha, WI
Stephanie Bond Suski-Fluhrer	Raleigh

Curriculum and Instruction, Marketing Education Concentration

Degrees To Be Conferred December 16, 1998

Bruce David Dudley	Weaverville
William Jonathan Swanson	Lenoir

Higher Education Administration

Degree Conferred August 11, 1998

Anita Branch Walton	Seaboard
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Degrees To Be Conferred December 16, 1998

Benjamin Jeffery Trapanick	Utica, NY
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Mathematics Education

Degree Conferred August 11, 1998

Veronica Vick Robinson	Tarboro
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Degrees To Be Conferred December 16, 1998

Sue Newman Wall	Raleigh
Tamara Colette Watson	Smithfield

Middle Grades Education

Degrees Conferred August 11, 1998

Kellie Theresa Brown	Willow Springs
Margaret Coretta Hamilton	Hartford, CT
Jeffrey Scott Kulp	Raleigh
Alicia Kay McAllister	Lumberton
Steven Allen Sloan	Raleigh
Julie Gibson Weber	Miami, FL

Georjanne Phyllette Williams Raleigh

Degree To Be Conferred December 16, 1998

Wendy Marie Lejeune Blewett New Iberia, LA

Occupational Education

Degrees To Be Conferred December 16, 1998

Alexander Walker Cameron Whispering Pines

Darlene Kiser Fisher Carthage

Science Education

Degree Conferred August 11, 1998

Lori Angel Stepp Raleigh

Special Education

Degrees Conferred August 11, 1998

Nancy Wicker Gooding Raleigh

Kristan Bennett Jones Kernersville

Degrees To Be Conferred December 16, 1998

Tonya Denise Curvin Salemburg

Deborah Garrison Guarniere Yardville, NJ

Caroline Elizabeth Ingold Durham

Jennifer Lea Roberson Fayetteville

Sandra Buchanan Shojinaga Raleigh

Nicole Elizabeth Tierney Raleigh

Technology Education

Degree Conferred August 11, 1998

Kobie Kareem Joyner Cary

MASTER OF ENGINEERING

Degrees Conferred August 11, 1998

Randall Allen Beck Mayfield Heights, OH

Myra Anne Ezell Pittsboro

Sanjeeth Mangalore Pai Rocky Mount

Nicholas Granville Purinton Washington, DC

Richard Corpuz Simeon Raleigh

Timothy Clifford Snyder Piscataway, NJ

Degrees To Be Conferred December 16, 1998

Kevin Scott Barnhill	Raleigh
James Lee Baucom	Conover
Timothy Max Clubb	Asheville
Jonathan Todd Dorny	Philadelphia, PA
Andrew Paul Fekete	Richmond, VA
James Harold Ferguson	Winston-salem
Ann Marie O'Donohue Fletcher	Livonia, MI
Franklin Calvin Gaskins Jr.	New Bern
Cynthia Gillespie	Elizabethtown
Jeffrey Todd Hicks	Cary
Brett Graham King	Apex
William Lee Kiser	Morganton
Gerard Matthew Krug	Asheville
Jeffery Ray Moser	Hillsborough
Jack Darrin Oates	Kenton, OH
Kurt Scott Preston	Cypress, TX
Douglas Todd Shuping	Salisbury
Robert Otto Stroebel	Fennimore, WI
Michael Ray Vastag	Indianapolis, IN

MASTER OF ENTOMOLOGY

Degrees To Be Conferred December 16, 1998

Theodore Edmond Snyder	Riverside, CA
Sandra Winia Wattimena	Jakarta, Indonesia

MASTER OF FISHERIES AND WILDLIFE SCIENCES

Degree Conferred August 11, 1998

Miriam Gonzalez Ferzli	Raleigh
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MASTER OF FORESTRY

Degree To Be Conferred December 16, 1998

Matt Haviland Cooksey	Laplata, MD
-----------------------	-------------

MASTER OF HORTICULTURAL SCIENCE

Degrees To Be Conferred December 16, 1998

David Joe Goforth	Pekin
James Dale Witt	Pasadena

MASTER OF INDUSTRIAL DESIGN

Degree Conferred August 11, 1998

Michael Brandon Love	Pilot Mountain
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Degrees To Be Conferred December 16, 1998

James Nevin Fryer	Raleigh
Scott Roderick Gant	Leeds, ND
Michael Eugene Moon	Graham
Elizabeth Anne Parker	Raleigh
Dana Suzanne Young	Shreveport, LA
Erin Kortne Zitelli	Reston, VA

MASTER OF INDUSTRIAL ENGINEERING

Degrees To Be Conferred December 16, 1998

Dawn Jackson Hampton	Dunn
Carey Christopher Hobbs	Marvin
Prashant Krishnan	Bombay, India
Ching-Han Lee	Cary
Sharon Kramer Noe	Charlotte
Witoon Panusittikorn	Bangkok, Thailand
Umesh Rustogi	Delhi, India

MASTER OF INTEGRATED MANUFACTURING SYSTEMS ENGINEERING

Degrees Conferred August 11, 1998

Taojian Feng	Shanghai, People's Republic of China
Ronald Dean Hurst	Dalton, GA
Jirawan Kloypayan	Bangkok, Thailand

Degrees To Be Conferred December 16, 1998

Thomas Joseph Carrubba	Toms River, NJ
Tao Li	Beijing, People's Republic of China

MASTER OF LANDSCAPE ARCHITECTURE

Degrees Conferred August 11, 1998

Elaine Marie Burkel Walker	Raleigh
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Degrees To Be Conferred December 16, 1998

Patricia King Allen	Cary
Brian David Brodersen	Charlotte
Jennifer Lauren Camia	Greensboro
Sara Lorraine Chambers	Indianapolis, IN
Michael Anthony Ciriello	Enfield, CT
Martha Jane Dees	Goldsboro
Thomas Scot Dunlap	Whiteville
Jennifer Lee McLaughlin	Middletown, NJ
Michelle Saxe Wallace	Raleigh
Mary Gwyn Woltz	Mount Airy

MASTER OF MATERIALS SCIENCE AND ENGINEERING

Degrees To Be Conferred December 16, 1998

Mark Kian Behbehani	Cincinnati
Ambika Hosagrahar Somashekhar	Raleigh
Jeremy Allen Walraven	Trenton, NJ

MASTER OF NATURAL RESOURCES

Degrees Conferred August 11, 1998

Michael Harry Athanas	Charlotte
Matthew Patrick Hamilton	Minot, ND
Jennifer Lynn Otter	Raleigh
Laura Davis Pickens	Asheville
Anne Marie Queen	Raleigh
Jennifer Susan Wiley	Mebane

Degrees To Be Conferred December 16, 1998

Kathleen Thomas Summitt	Raleigh
Dani Erin Wise	Point Harbor
Francoise Marie Webster	Clayton
Larry Dean Grantham, Jr.	Four Oaks
Raleigh David Myers	Fayetteville

MASTER OF OPERATIONS RESEARCH

Degree Conferred August 11, 1998

+ Scott Davis DeWald	Gibsonia, PA
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Degree To Be Conferred December 16, 1998

Michael Tyrone Walker	Marietta
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MASTER OF PARKS, RECREATION AND TOURISM MANAGEMENT

Degrees Conferred August 11, 1998

Mary Lou Addor	Cary
Hugh Devon Autry	Coats
Shelly Clark Johnston	Iron Station
Carren Dick Stewart	Bozeman, MT

Degree To Be Conferred December 16, 1998

Leonard Keith Jenkins	Smithfield
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MASTER OF PHYSICS

Degree Conferred August 11, 1998

Michael Parker Owen Raleigh

MASTER OF PHYSIOLOGY

Degree Conferred August 11, 1998

Tracey Elmore Samsam Mocksville

MASTER OF PUBLIC ADMINISTRATION

Degrees Conferred August 11, 1998

Michael John Koivisto Winston-Salem
Raymond Matthew Longabaugh Pittsboro
Andre Craven Pierce Mooresville
Carol Heller Redfield Rye, NY
Maria Hammond Tuttle Raleigh
Julie Ann White Grand Rapids, MI
Kimberly Engle Williams Raleigh

Degrees To Be Conferred December 16, 1998

Christine Adams Castelloe Tarboro
Gregory Francis Schwitzgebel III Raleigh
William Gordon Terry Chapel Hill

MASTER OF SOCIOLOGY

Degree To Be Conferred December 16, 1998

Karyn Lee Christiana Pittsburgh, PA

MASTER OF SOIL SCIENCE

Degree To Be Conferred December 16, 1998

David Bauer Saint Marys, PA

MASTER OF STATISTICS

Degrees To Be Conferred December 16, 1998

Andrew Paul Skrylov San Francisco, CA
Mehmet Nihat Solakoglu Ankara, Turkey

MASTER OF TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT

Degrees Conferred August 11, 1998

Stephanie Rose Kuck Hayden

Eva June Narber Columbia, MO

Degree To Be Conferred December 16, 1998

Pamé Raquel Sawyer Walkertown

MASTER OF TEXTILES

Degrees Conferred August 11, 1998

Mitzi Christine Cook Raleigh

William Carey Cox High Point

Mendy Elizabeth Grantham Mount Olive

Degrees To Be Conferred December 16, 1998

Hakan Esimek Tarsus, Turkey

Ozgur Ozkurt Izmir, Turkey

MASTER OF WOOD AND PAPER SCIENCE

Degree Conferred August 11, 1998

Rahul Haren Nawab Raleigh

MASTER OF ZOOLOGY

Degree To Be Conferred December 16, 1998

Toni Schutz Onks Cary

Master of Arts Degrees

English

Degrees Conferred August 11, 1998

Elizabeth Anne Bir Brevard

Lisa Marguerite Covington Clayton

Tracie Michelle Fellers Durham

Michael Drake Greco Catharpin, VA

Rebecca Riddick Hayes Swannanoa

Nancy Pasternack Kenkel Columbia, MD

Sharon Sanchez McCarson Las Cruces, NM

Elizabeth Suzanne Renn Wilmington

Laura Baker Shearer Columbia, MD

Nathanial Benjamin Smith Saint Joseph, MI

Amy Carol Stephens Morganton

Miriam Celia Watson Greenville, SC

Degrees To Be Conferred December 16, 1998

Austin Murphy Allran	Hickory
Elaine Weslee Green	Laurel, MD
Peter Jay Ingrao	High Point
Mary Kristina Pierce	Thomasville

History

Degrees Conferred August 11, 1998

Kelly Marie Powell	Carrboro
Carl Allan Robin	Pittsburgh, PA
Alec Whittaker	Raleigh

Degree To Be Conferred December 16, 1998

Michelle Sharon Frisbie-Fulton	New Orleans, LA
Marc John Hellems	Pittsford, NY
Nancy Jennifer Kaiser	Chapel Hill
Michael Todd McKinney	Bakersville
Robert Leamon Richardson	Raleigh
Amy Joan Woolam	Ocean City, NJ

Liberal Studies

Degrees Conferred August 11, 1998

Chrystal Angelia Bartlett	Raleigh
Kevin McHugh FitzGerald	Hamden, CT
Robert Darrell Harding	Garner
Laura Hermes Nemecek	Raleigh
Andrew Mitchell Provo	Raleigh

Degrees To Be Conferred December 16, 1998

Kristen Marie Burnette	Monroe
Victor Edward Clayton, Jr.	Cary
Paige Reece McCormick	Youngsville
Mitchell James Million	Pittsboro
Annabelloraine M. Rutherford	Cary
Yuko Tomioka	Tokyo, Japan

Political Science

Degree Conferred August 11, 1998

Panagiotis Lolos	Athens, Greece
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Degree To Be Conferred December 16, 1998

Debora Lynn Beachner Hannula	Syracuse, NY
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Public History

Degree Conferred August 11, 1998

Paul Edmund Harris Raleigh

Degree To Be Conferred December 16, 1998

Andrea Rose Hodges Greensboro

Master of Science Degrees

Aerospace Engineering

Degree Conferred August 11, 1998

Jason Roy Fields Farina, IL

Degree To Be Conferred December 16, 1998

Heather Pauley Houlden Newport News, VA

Agricultural and Resource Ecomonics

Degree Conferred August 11, 1998

Wesley Creighton Dugan Brooksville, KY

Animal Science

Degrees Conferred August 11, 1998

Jihad Mustafa Abdallah Nablus, West Bank
Christina Mareskes Benson
Christine Margaret Wachter Prairie du Chien, WI

Applied Mathematics

Degree Conferred August 11, 1998

Beymer Bevill, Jr. Fuquay-Varina

Degrees To Be Conferred December 16, 1998

Floris Kathleen Cash Stony Brook, NY
Karen Leonard Klein Garner

Biological and Agricultural Engineering

Degrees Conferred August 11, 1998

Jennifer Scot Dikeman	Littleton
Kurt Edward Parbst	Pinehurst
Melanie Talanda Young	Durham

Degrees To Be Conferred December 16, 1998

Bryan Paul Clark	Newton
Jeffrey Michael Parker	Albemarle

Botany

Degree Conferred August 11, 1998

Kevin Michael Cox	Asheville
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Degrees To Be Conferred December 16, 1998

Catherine Margaret Clark	Raleigh
Amie Caroline Scott	Winston-Salem
Md. Hemayet Ullah	Dhaka, Bangladesh

Chemical Engineering

Degree Conferred August 11, 1998

Howard Jerome Walls	Boulder, CO
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Degrees To Be Conferred December 16, 1998

Lance Edward Driskill	Raleigh
Monica Renee Hitchcock	Montrose, PA

Chemistry

Degree Conferred August 11, 1998

Ryan William Vest	Atlanta, GA
-------------------------	-------------

Degrees To Be Conferred December 16, 1998

Andrew Kiskadden Boal	Amherst, MA
Kevin Patrick Cannell	Jacksonville, IL
Jessica Urbanik Coughlin	Raleigh
Gary Martin Green	Greensboro
Cheryl Lynn McArdle	Rochester, NY
Jill Cardwell Mikulecky	Lebanon, TN
Karen Caveness Stokes	Julian

Civil Engineering

Degrees Conferred August 11, 1998

Julie Ann Godin	South Lyon, MI
Jonathan Kennedy Rash	Franklin, KY
Andrew Harrison Rike	Memphis, TN

Degrees To Be Conferred December 16, 1998

Tatjana Blell	Belgrade, Yugoslavia
John Case Davis	Glasgow, KY
Robert Ellis Dodson	Bridgeport, WV
Robert Scott Morris	Matthews
Patrick David Thiedeman	Salisbury

Comparative Biomedical Sciences

Degree To Be Conferred December 16, 1998

William Hevener V	New Bern
-------------------------	----------

Computer Engineering

Degrees Conferred August 11, 1998

Rituraj Chauhan	Raleigh
Jeffrey Douglas Jackson	Red Springs
Anand Sambath Kumar	Vellore, India
Li Li	Beijing, People's Republic of China
Neil Joseph Maldonado	New Iberia, LA
Joseph Christopher Rizza	Peekskill, NY
Kenneth Earl Waters II	Hertford
Zhiling Zheng	Shanghai, People's Republic of China

Degrees To Be Conferred December 16, 1998

Sonali Aditya	Pune, India
Visweswara Bala	Madras, India
Wenjie Bao	Nanjing, People's Republic of China
Pallavi Belkale	Bangalore, India
Vasudev Kundapur Bhat	Bangalore, India
Sunil Bothra	Raleigh
Michael Alexandrovich Bugaev	Raleigh
Dennis Albert Doidge	Cary
Jun Du	Tianjin, People's Republic of China
Robert Douglas Edmondson	Creston
Chenhao Geng	Changzhou, People's Republic of China
Ana Elisa Pereira Goulart	Campinas, Brazil
Fei Hu	Beijing, People's Republic of China
Roger Dwain Isaac	Claremont
Sanjay Kumar Kedia	Calcutta, India
Sreenath Kurupati	Varanasi, India
John Walter Linville	Kernersville

Sheldon Mark Lobo	Bombay, India
Eric James Lowe	Fayetteville
Praveen Mandava	Vij, India
Sangeetha Mani	Madras, India
Radhikha Myneni	Hyderabad, India
Phoemphun Oothongsap	Lampang, Thailand
Ruchika Pandey	Delhi, India
Mary Ann Phillips	Emerald Isle
Rachid Elias Rayess	Himlaya-matn, Lebanon
William Robert Roper	Cary
Min Tu	Beijing, People's Republic of China
Qian Wang	Nanjing, People's Republic of China
David William Watson	Raleigh
Wei Wei	Zhengzhou, People's Republic of China
Shumin Zhang	Shaanxi, People's Republic of China

Computer Science

Degrees Conferred August 11, 1998

Andrew Spencer Freeman	Teaneck, NJ
Diheng Qu	Beijing, People's Republic of China
Jeffrey James Stuckey	Goshen, IN

Degrees To Be Conferred December 16, 1998

Joel Gregoire	Emerainville, France
Anuj Kumar Jain	Saharanpur, India
Jiejun Kong	Shanghai, People's Republic of China
+ David Ian Rosnick	Raleigh
Xiaokang Sang	Raleigh
Jennifer Janette Sellers	Sanford
Kai Sun	Beijing, People's Republic of China
Stuart Grant Towns	Pensacola, FL
Haining Wang	Jinan, People's Republic of China
Xiaoyong Wu	Beijing, People's Republic of China
Hongjie Xin	Zhejiang, People's Republic of China
Xingqiang Zeng	Gutian, Fujian, People's Republic of China

Counselor Education

Degree Conferred August 11, 1998

Allison Finan Corkey	Raleigh
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Crop Science

Degree Conferred August 11, 1998

Troy Carey Marquardt	Greensboro
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Degrees To Be Conferred December 16, 1998

Arthur Lawrence Bradley, Jr.	Rocky Mount
Ramsey Steven Lewis	Randolph, NE
Susana Rita Milla	Lima, Peru
Terence Luke Molnar	Santa Fe, NM
Georgia Anna Pate	Rowland
Mary Diane Paulsgrove	Chapel Hill
Alexander McLeod Stewart	Carthage

Curriculum and Instruction (Marketing Education Concentration)

Degree To Be Conferred December 16, 1998

Shiau Yen Chin-Dennis	Raleigh
-----------------------	---------

Electrical Engineering

Degrees Conferred August 11, 1998

Priya Ananthanarayanan	Mumbia, India
Nevin Kapur	Bombay, India
Steven Francis LeBoeuf	Houma, LA
Andrew Edward Oberhofer	Charlotte
Anuradha Ramamurthy	Bombay, India

Degrees To Be Conferred December 16, 1998

Kenneth Crawford Armstrong	Chapel Hill
Amit Bose	Knoxville, TN
Lei Cao	Huainan, People's Republic of China
Kerrance Lynn Carpenter	Salisbury
John Peter Cavaroc	New Orleans, LA
Jarvis Arno Davis	Richmond, VA
Xiaofan Fei	Dalian, People's Republic of China
Aimin Zhang Galbraith	Shanghai, People's Republic of China
Anthony Harold Grieco	Rainbow City, AL
Omar Aref Hassan	Beirut, Lebanon
John Robert Hertzog	Omaha, NE
Zhihong Hong	Hainan, People's Republic of China
Bruce Richard Linnell	Richmond, VA
Stephen Edward Mick	Houston, TX
Nina Kantilal Mutha	Charlotte
Haixiang Ni	Shaoxin, People's Republic of China
Shubhankar Prakash Pundlik	Bombay, India
Xinzhou Qin	Beijing, People's Republic of China
Jian Qiu Qu	Raleigh
Ksenia Roze	Saint Petersburg, Russia
Kirk Everett Russell	Winston-Salem
Ramanan Subramanian	Tiruvannamalai, India
John Christopher Tucker	Charlotte
Usen E. Udoh	Fort Valley, GA
Eric Walburger	Sierentz, France
Michael Allen Whitaker	Siloam

Entomology

Degree Conferred August 11, 1998

Lee Sterling Hall Raleigh

Fisheries and Wildlife Sciences

Degrees Conferred August 11, 1998

Marsha Shannon Haney Weddington

James Christopher Turner Sanford

Degrees To Be Conferred December 16, 1998

Jeffrey Franklin Marcus Newton, MA

Jessie Maria Schillaci Pittsfield, MA

Food Science

Degrees Conferred August 11, 1998

Buffy Marie Beard Vale

Jill Ann Brindisi Hazlet, NJ

Angela Nicole Cauley Columbus, OH

Denise Casey Crowell Snow Hill

Tammy Lynn Hicks Southern Pines

Degrees To Be Conferred December 16, 1998

Carol Sue Dombroski Ronkonkoma, NY

Nikki Chiara Drye Fayetteville

+ Paz Etcheverry Buenos Aires, Argentina

Dana Phillips McElroy Pleasant Gap, PA

James Dwight Parker Youngsville

Forestry

Degrees Conferred August 11, 1998

Susan Alese Cohen Atlanta, GA

Jason Iago Guidry Hayesville

Daniel Norton Webster Milford, DE

Degrees To Be Conferred December 16, 1998

Jane Marie Almon Wilmington

Paul James Belonger Two Rivers, WI

Pablo Javier Crespell Raleigh

+ Julie Elice Fontaine Raleigh

Scott James Frederick Raleigh

Jens W. Geratz Chapel Hill

Douglas Seabrook Parker Raleigh

Higher Education Administration

Degree To Be Conferred December 16, 1998

Philip Gene Handwerk Greensboro

Horticultural Science

Degrees To Be Conferred December 16, 1998

Terry Allen Garwood Moravian Falls
Lucia Elena Villavicencio Maracaibo, Venezuela

Immunology

Degree To Be Conferred December 16, 1998

Diane O'Keefe Probasco Raleigh

Industrial Engineering

Degree Conferred August 11, 1998

Natalie Anne Stanislaw Upland, IN

Degree To Be Conferred December 16, 1998

Marty Edwin Donovan Federal Way, WA

Management

Degree Conferred August 11, 1998

Kendall Scott Newswanger Durham

Degrees To Be Conferred December 16, 1998

Carl Louis Bush III Raleigh
Lisa Ann Dale Cary
James Edward Dienes Cary
Gregory Scott Frey Louisville, KY
Jamie Scott Gibson Raleigh
Arthur Earl Hohnsbehn Garner
Charles Steven Johnston Hurdle Mills
Beverly Hicks Leathers Raleigh
Feng Lin Shanghai, People's Republic of China
Julie Anne Lindquist Raleigh
David Anthony Lott Natchez, MS
Afroze Mahamood Mahate Bombay, India
Christopher Douglas Newton Pelham Manor, NY
Eric Jon Patow Winston-Salem

Marine, Earth and Atmospheric Sciences

Degrees Conferred August 11, 1998

Lisa Lowe Etherington	Pittsburgh, PA
Matthew Sayre Kendall	Saint Petersburg, FL
Xiaoming Liu	Raleigh
Douglas Glenn Schneider	Sanford
Dan Andrew Shaltanis	Ankeny, IA
John Thomas Walker Jr.	Madison, MS

Degrees To Be Conferred December 16, 1998

Ward Elmer Elis	Raleigh
Benjamin Harry Houston	Rochester, NY
Lara Elizabeth Joyce	Mooreville
Haydee Gleason Phelps	Katonah, NY
Wei Shi	Qingdao, People's Republic of China
James Arnold Thurman	Kinston

Materials Science and Engineering

Degrees Conferred August 11, 1998

SungKee Han	Whitestone, NY
Brian Lee McCarson	Las Cruces, NM

Degrees To Be Conferred December 16, 1998

Ahmet Gun Erlat	Ankara, Turkey
Joseph Smith Holmes Jr.	Olivia
Susan Agneta Lloyd	Chapel Hill
Timothy Patrick Smith	Raleigh
Darin Taze Thomas	Salisbury
Nathaniel Mark Williams	Hurdle Mills

Mechanical Engineering

Degrees Conferred August 11, 1998

Daniel Marion Deaton III	Tabor City
Christopher Mark Elliott	Raleigh
John Craig Fasick	Akron, OH
Charles Walton Grant	Raleigh
Phillip Eugene Jones	Crumpler
Simon John Kelly	Four Oaks
Kashyap Muthuraman	Calcutta, India
Mallory Shane Price	Jacksonville
Jodie Dianne Sholar	Monroe

Degrees To Be Conferred December 16, 1998

Qunyi Chen	Shen Yang, People's Republic of China
Mark Christopher Etheridge	Raleigh

Sreenivas Kuchibhatla	Cary
Donna Youngdahl Maskill	Mebane
Brian Francis Mellage	Raleigh
Paul Dwight Minor	Bristol, CT
Tao Zhang	Chenhdu, People's Republic of China

Microbiology

Degrees Conferred August 11, 1998

Paul Andrew Jenny	Lake Geneva, WI
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Natural Resources

Degree Conferred August 11, 1998

Ryan William Belyea	Columbia, MO
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Nuclear Engineering

Degrees To Be Conferred December 16, 1998

Gregory Edward Dale	Albuquerque, NM
Jacob Eapen	Trivandrum, India
Krupakar Murali Subramanian	New Delhi, India

Operations Research

Degrees Conferred August 11, 1998

Shona KaWanda Davidson	Mitchellville, MD
Forrest Barry Stringer	Mount Olive

Parks, Recreation and Tourism Management

Degrees Conferred August 11, 1998

David Neary Cernicek	Los Alamos, NM
Pui Yin Choy	Hong Kong, People's Republic of China
Akira Morita	Tokyo, Japan
Michael Rock	Raleigh

Degrees To Be Conferred December 16, 1998

Richard Eric Gulledge	Greensboro
Willinda Wiline Newberry	Swords Creek, VA

Physics

Degree Conferred August 11, 1998

Louie Cecil Elliott IV	Cowan, TN
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Degrees To Be Conferred December 16, 1998

William Chandler Beal	Durham
Kimberly Anne Bell	Burke, VA
Jeffrey David Brown	Lincolnton
Duane Lee Deardorff	Raleigh
Kristy Kathleen Dyer	Denver, CO
Suzanne Hooper Huerth	Harnett
Gary Duane Powell	Granby, CO
Christopher Shawn Thaxton	Lexington, KY
Eric Boyd Wright	Wilmington

Physiology

Degrees Conferred August 11, 1998

Whitney Claire Ellis Nicholson	Raleigh
Wellington Shu-Tin Tsai	Holmdel, NJ

Plant Pathology

Degree To Be Conferred December 16, 1998

Jillanne Renee Burns	Long Island, NY
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Poultry Science

Degree Conferred August 11, 1998

+ Christopher William Parks	Wilmington, DE
-----------------------------	----------------

Degrees To Be Conferred December 16, 1998

+ Jose Juan Bruzual Marquez	Caracas, Venezuela
Rachel Elizabeth Doerfler	Raleigh

Psychology

Degrees Conferred August 11, 1998

Kelley Renee Burden	Newark, OH
Celeste Marie Mayer	Elliott City, MD
Maureen Ann Mendick	Apex
Laurie Anne Wenninger	Swampscott, MA
Susan Michelle Whichard	Greensboro
Osamu Yamamura	Yamanashi-ken, Japan

Degrees To Be Conferred December 16, 1998

Malissa Ann Bailey	Raleigh
Julie Lynne Biederman	Columbia, MD
Blancadela Jimenez Cobb	Fayetteville
Jonathan David Levine	Temple Terrace, FL
Alisa Mary Radziewicz	Garden City, NY

Rural Sociology

Degree Conferred August 11, 1998

Helen Marcinda Mason Howe, IN

Science Education

Degree Conferred August 11, 1998

James Blake Calkin Harrisburg, PA

Soil Science

Degrees Conferred August 11, 1998

William Allen Hayes Jr. Fairmont

Brian McNeill Smith Chapel Hill

Degree To Be Conferred December 16, 1998

Sue Ellen Hendricks Lititz, PA

Technical Communication

Degree Conferred August 11, 1998

Kirsten Elizabeth Hale Gainesville, FL

Elizabeth Ann Hardin Raleigh

Degrees To Be Conferred December 16, 1998

Jennifer Jo Moore Woodbury, MN

Sherry Eugenia Tillery Halifax

Textile Chemistry

Degree To Be Conferred December 16, 1998

Natacha Berthelon Macon, France

Textile Engineering

Degrees To Be Conferred December 16, 1998

Guldemet Basal Tokat, Turkey

Kevin Legette Cecil Asheville

Walter Jason Johnson McLeansville

Sugjoon Lee Seoul, South Korea

Textiles

Degrees Conferred August 11, 1998

Yoon Joong Hwang	Choonchun, South Korea
Stefan Alexander Kuehnen	Klosterneuberg, Austria

Degrees to be Conferred December 16, 1998

Surya Prabh Gupta	Faridabad, India
Stacey Lee Schertel	Burlington, MA

Toxicology

Degree To Be Conferred December 16, 1998

Ashlee Elizabeth Walker	Albany, GA
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Veterinary Medical Sciences

Degree Conferred August 11, 1998

Robert Scott Bakal	Raleigh
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Wood and Paper Science

Degree Conferred August 11, 1998

Weishang Hu	Beijing, People's Republic of China
Jeffrey Thomas Wheless	Louisburg
Jun Zheng	Beijing, People's Republic of China

Degree To Be Conferred December 16, 1998

Yubo Huang	Nanjing, People's Republic of China
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Zoology

Degrees To Be Conferred December 16, 1998

Julie Ann Brown	North Wilkesboro
Robert William Clark	Wilmington
Michael Kent Grammer	Austin, TX
Joanne Elizabeth Harcke	Wilmington, DE
Catherine Moore Wannamaker	Orangeburg, SC

Doctor of Education Degrees

Degrees Conferred August 11, 1998

Fletcher Barber, Jr., Adult and Community College Education
Trenton, North Carolina

Dissertation: An Exploration of Area Agents' Roles in Programming with an Emphasis on Evaluation Assessment Techniques. (Under the direction of R. David Mustian.)

Judy Conway Gordon, Higher Education Administration
Raleigh, North Carolina

Dissertation: The Relationship among Self-study Reaccreditation Teams, Their Leaders and the Community College Climate within Which They Work. (Under the direction of George A. Baker III.)

Amanda Carol Toler, Higher Education Administration
Washington, North Carolina

Dissertation: The Role of Academic Departments in the English Screening and Pedagogical Training of International Teaching Assistants. (Under the direction of George B. Vaughan.)

Lynn Christine Williams, Educational Administration and Supervision
Apex, North Carolina

Dissertation: Correlations between Effective School Leadership and Cognitive Complexity. (Under the direction of Raymond G. Taylor, Jr. and Alan J. Reiman.)

Degrees To Be Conferred December 16, 1998

Reed Adam William Altman, Adult and Community College Education
Chapel Hill, North Carolina

Dissertation: Participatory Methods of Community Development and Funding Processes: The Case of Community Development Organizations in Kenya. (Under the direction of R. David Mustian.)

Kari Sydness Anderson, Adult and Community College Education
Lakefield, Minnesota

Dissertation: Let the Games Begin: The Gaming Approach as an Alternative Paradigm in Nursing Education. (Under the direction of J. Conrad Glass, Jr.)

Kurt Richard Buttleman, Higher Education Administration
Morton, Illinois

Dissertation: An Investigation of Outsourcing of Functional Service Areas at Two-year Colleges. (Under the direction of George A. Baker III.)

Daniel Thomas DeMarte, Higher Education Administration
New Baltimore, Michigan

Dissertation: A Measure of Trust in the Work Relations of Chief Executive Officers, Board Chairpersons and Faculty Collective Bargaining Representatives in Community Colleges. (Under the direction of George A. Baker III.)

Ellanor Louise Graves, Adult and Community College Education
Burlington, North Carolina

Dissertation: A Comparative Analysis of Variables Impacting Persistence in Select Adult High School Diploma Programs in the North Carolina Community College System. (Under the direction of J. Conrad Glass, Jr.)

Richard Lee Haley, Educational Administration and Supervision
Fayetteville, North Carolina

Dissertation: Public School Funding in North Carolina: A Microanalysis of Equity, Adequacy, Educational Need and Outcome. (Under the direction of Elizabeth MacPhail-Wilcox.)

John Michael Handley, Adult and Community College Education
Fayetteville, North Carolina

Dissertation: The Carnegie Corporation and the American Association for Adult Education. (Under the direction of Arthur L. Wilson.)

Linda Shoffner Isley, Educational Administration and Supervision
Raleigh, North Carolina

Dissertation: A Study of Subsequent Mathematical Outcomes for Students Taught Algebra I Using Algebra I: A Process Approach. (Under the direction of Elizabeth MacPhail-Wilcox.)

Lili Karen Johnson, Adult and Community College Education
Charlotte, North Carolina

Dissertation: Academic Preparation, Experiential Factors and Cognitive Performance in Basic Law Enforcement Training in North Carolina Community Colleges. (Under the direction of George A. Baker III.)

Mark Ottis Kinlaw, Adult and Community College Education
Lumberton, North Carolina

Dissertation: The Examination of Differences of Community College Climate Variables in a Rural Setting. (Under the direction of George A. Baker III.)

Lorraine Dianna Powers, Occupational Education
Raleigh, North Carolina

Dissertation: The Effects of Distance Learning Instruction and Cognitive Style to Academic Achievement and Attitudes among Graduate Students Enrolled in a Two-way Interactive Video Course. (Under the direction of Terrance P. O'Brien.)

Scott Michael Sherman, Higher Education Administration
Altoona, Pennsylvania

Dissertation: Perceptions Held by Management of Older Adult Worker's Job Effectiveness: As Believed by Older Adult Worker's 55+ Years of Age and Management-level Personnel. (Under the direction of J. Conrad Glass, Jr.)

Beverly Jean Smith, Educational Administration and Supervision
Kinston, North Carolina

Dissertation: Community Power Structures, School Board Types and Superintendent Leadership Styles in North Carolina. (Under the direction of Elizabeth MacPhail-Wilcox.)

Kenneth Dale Strmiska, Higher Education Administration
Allouez, Wisconsin

Dissertation: Development Officers' Occupational Knowledge Acquisition Processes: A Qualitative Study of Six Fund Raisers. (Under the direction of George B. Vaughan.)

Jane Wicker Trampus, Adult and Community College Education
Vass, North Carolina
Dissertation: Analysis of a Psychoeducational Intervention in the Affective Domain. (Under the direction of J. Conrad Glass, Jr.)

L Louise VanOsdol, Higher Education Administration
Cary, North Carolina
Dissertation: Change Strategies Used for Organizational Reengineering at Selected Large Community Colleges. (Under the direction of George A. Baker III.)

Evelyn Smith Williams, Adult and Community College Education
Cary, North Carolina
Dissertation: Cultural Competence and Mental Health Services for Children and Families: A Study of Innovation Diffusion. (Under the direction of Edgar J. Boone and Rosemary Gillett-Karam.)

Doctor of Philosophy Degrees

Degrees Conferred August 11, 1998

Cynthia Edith Adcox, Food Science
Livingston, Tennessee
Dissertation: Sterol Oxides: Characterization and Effects on a Mouse Macrophage Cell Line. (Under the direction of Leon C. Boyd and Jonathan C. Allen.)

Norman Aminuddin, Fiber and Polymer Science
Raleigh, North Carolina
Dissertation: Ammonia/Ammonium Thiocyanate-Cellulose System: Dissolution, Viscoelastic Behavior and Fiber Formation. (Under the direction of John A. Cuculo.)

Mir Shariful Azam, Electrical Engineering
Dhaka, Bangladesh
Dissertation: Custom CMOS Design and Architecture for Low-power High-performance Circuits. (Under the direction of Paul D. Franzone.)

Rajini Ishwariah Balay, Computer Science
Hyderabad, India
Dissertation: A Lightweight Middleware Architecture and Evaluation of Middleware Performance. (Under the direction of Harry G. Perros and Mladen A. Vouk.)

Venkatasubramaniam Banunarayanan, Electrical Engineering
Madras, India
Dissertation: A Transaction Assessment Method for Allocation of Transmission Services. (Under the direction of Mesut E. Baran.)

William Henry Bares, Computer Science
Erath, Louisiana

Dissertation: Real-time Generation of User and Context-sensitive Three-dimensional Animated Explanations. (Under the direction of James C. Lester and Woodrow E. Robbins.)

Neil Randolph Barnes, Chemistry
Garner, North Carolina

Dissertation: Electronic Structural Studies of Several Cationic Metalloporphyrins Bound to Nucleic Acids (Part I) and of Laser-ablated Species Leading to Thin Solid Layers of Ferroelectric $\text{Pb}(\text{Zr}_x\text{Ti}_{1-x})\text{O}_3$ (Part II). (Under the direction of Anton F. Schreiner.)

Jerry Joseph Batzel, Applied Mathematics
Miami, Florida

Dissertation: Modeling and Stability Analysis of the Human Respiratory Control System. (Under the direction of Hien T. Tran and John William Bishir.)

Francesco Bignami, Marine, Earth and Atmospheric Sciences
Rome, Italy

Dissertation: Classic Hydrography and Air-Sea Interaction Methodologies Applied to Coastal Oceanography: The Northeast Water Polynya (Northeast Greenland) and the North Carolina Continental Shelf. (Under the direction of Thomas S. Hopkins.)

Yvette Darlene Boyajian, Chemistry
Hubert, North Carolina

Dissertation: The Effect of Phenol-based Ligands on Vanadate Inhibition of the Protein Tyrosine Phosphatase YOP51* Δ 162. (Under the direction of Charles R. Cornman and Dennis W. Wertz.)

Scott Matthew Camphausen, Materials Science and Engineering
Fairport, New York

Dissertation: Structural, Mechanical and Optical Properties of $\text{t}_x\text{a-C}_{1-x}$ Deposited by a Filtered Cathodic Arc. (Under the direction of Jerome J. Cuomo.)

Hann-Yi Chen, Nutrition
Taipei, Taiwan, Republic Of China

Dissertation: Identification of Human Milk Antibacterial Factors and the Effect of Temperature on Activity. (Under the direction of Jonathan C. Allen.)

Xinghai Chen, Chemistry
Nanjing, People's Republic Of China

Dissertation: Synthetic Utility of N-Acyl-2,3-dihydro-4-pyridones as Building Blocks for Natural Product Synthesis. (Under the direction of Daniel L. Comins.)

Craig Peter Dahlgren, Marine, Earth and Atmospheric Sciences
Forked River, New Jersey

Dissertation: Population Dynamics of Early Juvenile Nassau Grouper: An Integrated Modeling and Field Study. (Under the direction of David B. Eggleston and Martin H. Posey.)

Robert Dean Day, Materials Science and Engineering
Los Alamos, New Mexico

Dissertation: Single Asperity Ploughing of Gold and Iridium. (Under the direction of Phillip E. Russell.)

José Camisão de Souza, Physiology
Lavras, Brazil

Dissertation: The Effects of Estradiol-17 B (E2) and Recombinant Bovine Somatotropin (bST) on Superovulation Response in Cattle. (Under the direction of Jack H. Britt and Steven P. Washburn.)

Nora Virginia Edwards, Materials Science and Engineering
Raleigh, North Carolina

Dissertation: Optical Properties and Residual Stress in Group III-V Nitride Films. (Under the direction of Klaus J. Bachmann and David E. Aspnes.)

Jason Raymond Fairlee, Microbiology
Schenectady, New York

Dissertation: Biodegradation of Aromatic Hydrocarbons by Defined Mixed Cultures of Soil Bacteria. (Under the direction of Jerome J. Perry.)

George Low Farnsworth III, Zoology
Reston, Virginia

Dissertation: Nesting Success and Seasonal Fecundity of the Wood Thrush, *Hylocichla mustelina*, in Great Smoky Mountains National Park. (Under the direction of Theodore R. Simons.)

Ricardo Gutierrez-Osuna, Computer Engineering
Madrid, Spain

Dissertation: Signal Processing and Pattern Recognition for an Electronic Nose. (Under the direction of H. Troy Nagle, Jr.)

Chae Joon Han, Chemical Engineering
Flushing, New York

Dissertation: Physiological Studies of Extremely Thermoacidophilic Microorganisms under Normal and Stressed Conditions. (Under the direction of Robert M. Kelly.)

Jongil Han, Marine, Earth and Atmospheric Sciences
Seoul, South Korea

Dissertation: Large Eddy Simulations of Aircraft Wake Vortices in a Homogeneous Atmospheric Turbulence. (Under the direction of Yuh-Lang Lin.)

Christoforos Harvatis, Computer Engineering
Athens, Greece

Dissertation: Performance-driven Partitioning, Global Placement and Pin Assignment for MCM Applications. (Under the direction of Paul D. Franzon.)

Holger Hans Heinisch, Electrical Engineering
Forst, Germany

Dissertation: Interpoly Oxide for Floating Gate Memory Devices Fabricated by Rapid Thermal Chemical Vapor Deposition. (Under the direction of Jimmie J. Wortman.)

Jennifer Mae Hontz, Mathematics
Raleigh, North Carolina

Dissertation: Root Multiplicities of Some Kac-Moody Lie Algebras of Indefinite Type. (Under the direction of Kailash C. Misra.)

Donny Lee Hunter, Educational Research and Policy Analysis
Broadway, North Carolina

Dissertation: Teaching as a Career Choice: The Effects of Cost and Proximity of Training on Students from Poor and Rural Areas. (Under the direction of Raymond G. Taylor, Jr.)

Chavonda Janeva Jacobs-Young, Wood and Paper Science
Augusta, Georgia

Dissertation: Use of Enzymes to Enhance Conventional Kraft Pulping. (Under the direction of John A. Heitmann and Richard A Venditti.)

Laura Geralyn Jull, Horticultural Science
Farmington Hills, Michigan

Dissertation: Seed Germination, Seedling Growth and Heat Tolerance of Atlantic White-cedar [*Chamaecyparis thyoides* (L.) B.S.P.]. (Under the direction of Frank A. Blazich.)

Levent Karagenc, Physiology
Ankara, Turkey

Dissertation: Development of Avian Primordial Germ Cells *In vivo* and *In vitro*. (Under the direction of James N. Petite and Muquarrab A. Qureshi.)

John Richard Kascenska II, Forestry
Lyndonville, Vermont

Dissertation: Changes in Perceived Risk and Competence during Rock Climbing. (Under the direction of Hugh A. Devine and Beth E. Wilson.)

Christopher Edward Keefer, Chemistry
Gainesville, Florida

Dissertation: Platinum 1,2-dithiolenes: Characterization by ¹⁹⁵ Pt NMR and Synthesis of Multinuclear Homo- and Heterobimetallic Complexes. (Under the direction of Robert D. Bereman and Suzanne T. Purrington.)

Nirupama Ramamurthy Kenkare, Chemical Engineering
Bombay, India

Dissertation: Polymer Networks and Gels: Simulation and Theory. (Under the direction of Carol K. Hall and Saad A. Khan.)

Jooyong Kim, Fiber and Polymer Science
Seoul, South Korea

Dissertation: On-line Measurement and Characterization of Yarn and Fabric Qualities Using a Wavelet-Stochastic Hybrid Method. (Under the direction of Moon Won Suh.)

Harry Robert Kirk, Materials Science and Engineering
Bremerton, Washington

Dissertation: Electron Beam Induced Current Analysis of Metal Oxide Silicon Structures. (Under the direction of George A. Rozgonyi.)

Erica Francis Kosal, Zoology
West Bloomfield, Michigan

Dissertation: The Potential Role of Parasites and the Influence of Size on Female Mate Choice of *Schistocerca americana* and *Dichromorpha viridis*, with Paternity Verified Via Random Amplified Polymorphic DNA (RAPDS) Technique. (Under the direction of Marianne N. Niedzlek-Feaver and Harold F. Heatwole.)

Adrienne I. Kovach, Zoology
West Greenwich, Rhode Island
Dissertation: Dominance and Reproduction in Male Black Bears. (Under the direction of Roger A. Powell.)

Darlene Desiree Kozub, Civil Engineering
Jamestown, New York
Dissertation: Denitrification in Constructed Wetlands Receiving Municipal Solid Waste Landfill Leachate. (Under the direction of Sarah K. Liehr.)

Ravi Nagarajarao Kurlagunda, Electrical Engineering
Durgapur, India
Dissertation: The Dual Gate Base Resistance Controlled Thyristor. (Under the direction of B. Jayant Baliga.)

Mary Elisabeth Lehman, Botany
Dover, Pennsylvania
Dissertation: Pretreatment and Dose Responses of Cucumber Seedlings to Ferulic Acid, an Allelopathic Phenolic Acid. (Under the direction of Udo Blum.)

Chunhua Liu, Crop Science
Jiangxi, People's Republic of China
Dissertation: Effects of Humic Substances on Creeping Bentgrass Growth and Stress Tolerance. (Under the direction of Richard J. Cooper.)

Jason Lye, Fiber and Polymer Science
Gorleston, Norfolk, England
Dissertation: Semi-empirical MO-Methods in Dye Chemistry: Studies Involving Disperse and Metal Complex Dyes. (Under the direction of Harold S. Freeman.)

DiPak Mahato, Genetics
Raleigh, North Carolina
Dissertation: Identification and Characterization of *headbanger*, a Novel Protein Required for *Deformed* Function during Embryogenesis of *Drosophila melanogaster*. (Under the direction of James W. Mahaffey.)

Xingzhong Min, Crop Science
Nanjing, People's Republic of China
Dissertation: Impact of Planting Pattern and Root System on Comparative Drought Resistance of a Soybean Plant Introduction under Field Conditions. (Under the direction of Robert P. Patterson.)

Donovan Edberth Moxey, Materials Science and Engineering
Nassau, Bahamas
Dissertation: Novel Processing and Properties of High Efficiency Superconducting Infrared Bolometric Detectors. (Under the direction of Jagdish Narayan.)

La Tondra Alyce Murray, Industrial Engineering
Hampton, Virginia
Dissertation: The Multimodal Graphical User Interface: Utilizing Auditory Cues as Tools for Performance and Usability. (Under the direction of Richard G. Pearson.)

Cynthia Joan Musante, Applied Mathematics
Barnstable, Massachusetts

Dissertation: A Distributed Parameter Model for Spatially Dependent Hepatic Processing of 2,3,7,8-Tetra-chlorodibenzo-p-Dioxin. (Under the direction of H. Thomas Banks and Hien T. Tran.)

Sachin Bhaskaran Nayar, Fiber and Polymer Science
Bombay, India

Dissertation: Hydrolyzed Reactive Dyes in the Coloration of Textile Fibers. (Under the direction of Harold S. Freeman and James W. Rucker.)

Patricia Ann O'Neil, Electrical Engineering
Wilbraham, Massachusetts

Dissertation: An Experimental Study on the Quality and Selectivity of Silicon Epitaxial Growth Using Disilane and Chlorine. (Under the direction of Mehmet C. Ozturk.)

Marianne Kristina Pedersen, Horticultural Science
Cali, Colombia

Dissertation: The Mechanism of Action of Cyclanilide, an Ethephon Synergist. (Under the direction of James D. Burton and Harold D. Coble.)

Debra Lynn Piddington, Microbiology
Colorado Springs, Colorado

Dissertation: Lithium Chloride Can Induce Susceptibility to TNF in a cPLA₂-dependent Manner. (Under the direction of Scott M. Laster.)

Sharon Moore Pullen, Psychology
Raleigh, North Carolina

Dissertation: The Impact of Beliefs about Aging on Intellectual Performance across Contexts. (Under the direction of Thomas M. Hess.)

Michael David Radmacher, Biomathematics
Corydon, Indiana

Dissertation: Mutation and Selection in the Germinal Center Reaction: Mathematical and Statistical Analyses. (Under the direction of Thomas B. Kepler.)

Siroos Rastani, Materials Science and Engineering
Gaithersburg, Maryland

Dissertation: Design, Construction and Operation of a PECVD System and Development of GeO₂-SiO₂ Thin Film Glass Dielectrics by Low Pressure Chemical Vapor Deposition. (Under the direction of John J. Hren and Arnold Reisman.)

Kristina Diane Rinker, Chemical Engineering
Jacksonville, Florida

Dissertation: Growth Physiology and Bioenergetics of the Hyperthermophilic Archaeon *Thermococcus litoralis* and Bacterium *Thermotoga maritima*. (Under the direction of Robert M. Kelly.)

Anthony Thyron Rivers, Computer Engineering
Moncks Corner, South Carolina

Dissertation: Modeling Software Reliability During Non-operational Testing. (Under the direction of Mladen A. V. Vouk.)

James Michael Roberts, Chemistry
Dover, Delaware

Dissertation: Voltammetric Characterization of Electrostatic Interactions in Colloidal Systems.
(Under the direction of Janet G. Osteryoung.)

Sudhir Kumar Rustogi, Civil Engineering
New Delhi, India

Dissertation: Incabinet Response Spectra. (Under the direction of Abhinav Gupta and Ajaya K. Gupta.)

Kay Aycock Sandberg, Chemistry
Willow Spring, North Carolina

Dissertation: I. Theoretical Investigations of Spin-Spin Interactions: Semiempirical Estimations of Exchange Parameters for Diradical Metalloporphyrin Cations and Zero Field Splitting Parameters for Conjugated Diradicals. II. Synthesis and Characterization of Radical-substituted Metalloporphyrins: Precursors for Potential Molecular Magnetic Building Blocks. (Under the direction of David A. Shultz.)

Christopher John Saranko, Toxicology
Plant City, Florida

Dissertation: The Roles of Two Epoxide Metabolites in the Mutagenicity of 1,3-Butadiene. (Under the direction of Robert C. Smart and Leslie Recio.)

Scott Jason Schatzberg, Comparative Biomedical Sciences
Apex, North Carolina

Dissertation: Molecular Studies of the Canine Dystrophin Gene. (Under the direction of Frederick J. Fuller and Nicholas J. H. Sharp.)

Alejandra Leppe Scott, Crop Science
Santiago, Chile

Dissertation: Production of Transgenic Tobacco Plants Expressing D5C⁺ Gene for Enhanced Disease Resistance. (Under the direction of Rebeca C. Rufty and Arthur K. Weissinger.)

Yuan Shao, Civil Engineering
Tianjin, People's Republic of China

Dissertation: Seismic Response of Unanchored Objects. (Under the direction of Chi Chao Tung.)

Keith Wayne Sharp, Materials Science and Engineering
Raleigh, North Carolina

Dissertation: Development of Grinding Models for Brittle Materials. (Under the direction of Ronald O. Scattergood.)

Brian David Strahl, Biochemistry
Chapel Hill, North Carolina

Dissertation: Transcriptional Regulation of the Ovine FSHB Gene by AP-1 and GnRH. (Under the direction of William L. Miller.)

Yusuf Cagatay Tekmen, Computer Engineering
Karsiyaka-izmir, Turkey

Dissertation: Performance-driven VLSI Placement Using Topology-insensitive Interconnect-length, Delay and Routability Estimation. (Under the direction of Paul D. Franzon and Griff L. Bilbro.)

Naresh Indralal Thapar, Electrical Engineering
Chembur, Mumbai, India

Dissertation: Accumulation Channel Driver Bipolar Transistor. (Under the direction of B. Jayant Baliga.)

Eric Matthew Vogel, Electrical Engineering
Charleroi, Pennsylvania

Dissertation: The Use of Rapid Thermal Chemical Vapor Deposited Oxynitrides for Advanced Gate Dielectrics. (Under the direction of Jimmie J. Wortman.)

Jianzhong Wei, Biochemistry
Jiangxi, People's Republic of China

Dissertation: Ferritin Gene Regulation in Plants (Under the direction of Elizabeth C. Theil.)

Yi-Min Wei, Mechanical Engineering
Taoyuan, Taiwan, Republic of China

Dissertation: Optimal Tool Selection and Design for End Milling and Face Milling Using Microgenetic Algorithms. (Under the direction of John S. Strenkowski.)

Chi-Tsung Wu, Statistics
Tainan, Taiwan, Republic of China

Dissertation: Generalized Estimating Equations for Spatially Correlated Data. (Under the direction of Dennis D. Boos and Marcia L. Gumpertz.)

Arman Rugo Yaghubian, Industrial Engineering
Yerevan, Armenia

Dissertation: Decision Support for Dry Kiln Scheduling in the Furniture Industry: A Local Improvement Heuristic Approach. (Under the direction of Thom J. Hodgson.)

Chien Sheng Yang, Electrical Engineering
Taipei, Taiwan, Republic of China

Dissertation: Very Low Temperature Materials and Self-alignment Technology for a-Si:H Thin Film Transistors Fabricated on Transparent Large Area Plastic Substrates. (Under the direction of Jimmie J. Wortman and Gregory N. Parsons.)

Elizabeth Anne York, Economics
Charlotte, North Carolina

Dissertation: The Effect of Health Status on the Labor Supply of Older Married Couples. (Under the direction of Robert L. Clark.)

Yanping Zhang, Wood and Paper Science
Raleigh, North Carolina

Dissertation: A Study of Ultrastructure of Wood and Pulped Fibers by Small Angle X-ray Scattering. (Under the direction of Heinz G. Olf.)

Degrees To Be Conferred December 16, 1998

Khaled Zakaria Ahmed, Electrical Engineering
Cairo, Egypt

Dissertation: Electrical Characterization of Advanced CMOS Devices. (Under the direction of John Reid Hauser.)

- Brian Samuel Armour, Economics**
 Decatur, Georgia
 Dissertation: Unanticipated Net Social Security Wealth's Effect on the Labor Supply Behavior of Young Male Cohorts in Full-time Private Employment and Self-employment. (Under the direction of Robert L. Clark.)
- Ki-Man Bae, Materials Science and Engineering**
 Seoul, South Korea
 Dissertation: Grown-in Defects in Silicon Wafer: Formation Mechanism and Surface Reactions. (Under the direction of George A. Rozgonyi.)
- Ilia Baldine, Computer Science**
 Dubna, Russia
 Dissertation: Dynamic Reconfiguration in Broadcast WDM Networks. (Under the direction of George N. Rouskas and Ioannis Viniotis.)
- Sanjeev Banerjia, Computer Engineering**
 Charlotte, North Carolina
 Dissertation: Instruction Scheduling and Fetch Mechanisms for Clustered VLIW Processors. (Under the direction of Thomas M. Conte.)
- Lilia Barrientos Priego, Crop Science**
 Chapingo, Mexico
 Dissertation: Evaluation of Mexican Peanut Landraces of the Variety *Hirsuta*. (Under the direction of Thomas G. Isleib.)
- Arnold Steven Bell, Counselor Education**
 Raleigh, North Carolina
 Dissertation: Measuring Moral Development in Nominally Assimilated Young Adults: A Comparative Analysis of the Defining Issues Test and the Moral Judgment Competency Test. (Under the direction of Herbert A. Exum.)
- Jonathan Alan Black, Microbiology**
 Monroe, Connecticut
 Dissertation: Development of an *In vitro* Assay to Study *Bordetella avium* Adherence and Partial Characterization of the Pilin Gene. (Under the direction of Geraldine H. Luginbuhl.)
- Stephen Poe Blackwelder, Sociology**
 Savannah, Georgia
 Dissertation: Power Bases and Decision-making Strategies: Practice of Gender and Couple Decision-making Theory. (Under the direction of Maxine P. Atkinson.)
- Stephen Peter Brooks, Mechanical Engineering**
 Littleton, Colorado
 Dissertation: Exact Solutions for Sorptive-Thermoelastic Composite Laminates in Cylindrical Bending. (Under the direction of Eric C. Klang.)
- Michael William Buksas, Applied Mathematics**
 Gilbert, Arizona
 Dissertation: Modeling, Analysis and Implementation of Forward and Inverse Problems in One Dimensional Electromagnetic Scattering with Differential and Hysteretic Polarization Models. (Under the direction of H. Thomas Banks.)

Stuart Campbell Burris, Chemistry

Campbellsville, Kentucky

Dissertation: Spectroelectrochemical Studies of Horse Cytochrome *c*. (Under the direction of Edmond F. Bowden.)

Neysa Michelle Call, Crop Science

Glendale, Kentucky

Dissertation: Biology and Physiology of the Noxious Weed, Tropical Soda Apple (*Solanum viarum* Dunal). (Under the direction of Harold D. Coble.)

James Campbell, Materials Science and Engineering

Randolph, New Jersey

Dissertation: High-temperature Tensile Deformation Behavior of Aluminum Oxide with and without an Applied Electric Field. (Under the direction of Hans Conrad.)

Scott David Carter, Nutrition, Poultry Science

Fort Wayne, Indiana

Dissertation: Bacterial Keratinase: Assay Development and Nutritional Application. (Under the direction of Jason C. H. Shih and Kenneth K. Krueger.)

Jana Willardson Cherrington, Toxicology

Richfield, Utah

Dissertation: Effects of Boric Acid on the Developing Vertebral Column and Ribs in the CD-1 Mouse *in Utero*. (Under the direction of Ernest Hodgson and Stacy Branch.)

Bor-Sen Chiou, Chemical Engineering

Feng-yuan, Taiwan, Republic of China

Dissertation: Rheology and Gelation of UV Cross-linking Polymers. (Under the direction of Richard J. Spontak.)

Chang-Min Chu, Marine, Earth and Atmospheric Sciences

Taoyuan, Taiwan, Republic of China

Dissertation: Effects of Orography on the Generation and Propagation of Mesoscale Convective Systems. (Under the direction of Yuh-Lang Lin.)

Heuiju Chun, Statistics

Kwang-ju, South Korea

Dissertation: Probabilistic and Statistical Modeling for Geometric Structure of Nonwoven Fabrics. (Under the direction of Moon Won Suh and Roger L. Berger.)

Robert Thomas Crosswell, Electrical Engineering

Crossett, Arkansas

Dissertation: Characterization of the Solubility, Electrical Behavior and Stress State of Undoped and B_2O_3/P_2O_5 Doped, As-deposited and Annealed PECVD Germanosilicate Glasses. (Under the direction of Arnold Reisman.)

Fonda Jonette Daniels, Computer Engineering

Winston-Salem, North Carolina

Dissertation: Producing Dependable Object-oriented Software Using Testing and Design Patterns. (Under the direction of Mladen A. V. Vouk.)

Timothy Alan Davis, Computer Science
Virginia Beach, Virginia
Dissertation: Rendering Ray-traced Animations with Frame Coherence in a Distributed Computing Environment. (Under the direction of Edward W. Davis, Jr.)

Michele Elaine DeCroix, Mechanical Engineering
Princeville, Illinois
Dissertation: The Effects of Unsteady Hydrodynamics on Soot Formation in a Counterflow Diffusion Flame. (Under the direction of William L. Roberts IV and James C. Mulligan.)

Ricardo Cruz-Herrera del Rosario, Applied Mathematics
Manila, Philippines
Dissertation: Computational Methods for Feedback Control in Structural Systems. (Under the direction of H. Thomas Banks.)

Erdem Dogan, Civil Engineering
Ankara, Turkey
Dissertation: Retrofit of Non-ductile Reinforced Concrete Frames Using High Performance Fiber Reinforced Composites. (Under the direction of Neven Krstulovic.)

Eva Rader Dover, Psychology
Raleigh, North Carolina
Dissertation: Children's Problem-solving Skills as a Mediating Link between Parenting Behavior and Children's Social Adjustment in Maltreating Families. (Under the direction of Mary E. Haskett.)

David Andrew Dudek, Chemical Engineering
Arlington Heights, Illinois
Dissertation: Copper Deposition from Cuprous-Ligand Complexes: A Contribution towards the Replacement of Cyanide in Strike-plating Baths. (Under the direction of Peter S. Fedkiw.)

Janice Ann Dye, Comparative Biomedical Sciences
Morrisville, North Carolina
Dissertation: Effects of Ozone and an Emission Source Particulate Air Pollutant on Rodent Airway Epithelial Cells. (Under the direction of Kenneth B. Adler.)

Wael Mohamad ElDessouki, Civil Engineering
Cairo, Egypt
Dissertation: Some Developments in Transportation Network Analysis and Design with Application to Emergency Management Problems. (Under the direction of Nagui M. Roupail and Yahya Fathi.)

George Christopher Godwin, Curriculum and Instruction
Benson, North Carolina
Dissertation: A Comparative Case Study of Eleven Good Rural Teachers: Community and Generativity. (Under the direction of Alan J. Reiman and John F. Arnold.)

Paul Vincent Goode, Jr., Electrical Engineering
Fort Bragg, North Carolina
Dissertation: Cardiac Wavefront Control Using Low-energy Stimulation. (Under the direction of H. Troy Nagle, Jr. and James J. Brickley.)

Ruth Limbrick Green, Psychology

Pittsboro, North Carolina

Dissertation: Retention and Achievement in One First-year Program: A Multivariate Analysis. (Under the direction of Denis O. Gray and Craig C. Brookins.)

Elizabeth Ann Gwartney, Food Science

Grayslake, Illinois

Dissertation: Texture and Flavor Release. (Under the direction of E. Allen Foegeding and Duane K. Larick.)

Michael Stephen Haigh, Economics

York, England

Dissertation: Hedging Multiple Price Uncertainty in International Grain Trade. (Under the direction of Matthew T. Holt and Barry K. Goodwin.)

Andrew David Hanser, Materials Science and Engineering

St. Louis, Missouri

Dissertation: Growth via Low Pressure Metalorganic Vapor Phase Epitaxy and Characterization of GaN and $\text{In}_x\text{Ga}_{1-x}\text{N}$ Thin Films. (Under the direction of Robert F. Davis.)

Laura Jean Harrell, Civil Engineering

Chesapeake, Virginia

Dissertation: Methods for Generating Alternatives to Manage Water Quality in Watersheds. (Under the direction of E. Downey Brill, Jr. and S. R. Ranjithan.)

Shannon VanHook Harris, Chemistry

Lynchburg, Virginia

Dissertation: Active Site Characterization and Cloning of a Juvenile Hormone Epoxide Hydrolase from the Insect *Trichoplusia ni*. (Under the direction of Russell J. Linderman.)

Carolyn Joan Henri, Forestry

Juneau, Alaska

Dissertation: Site Productivity and Portfolio Analysis of Commercial Forest Plantations in Western Venezuela. (Under the direction of Robert C. Kellison and Robert C. Abt.)

William Kirklen Henson, Electrical Engineering

Gastonia, North Carolina

Dissertation: Investigation of Direct Tunnel Gate Oxides Fabricated by Rapid Thermal Processing for Metal Oxide Semiconductor Field Effect Transistor Applications. (Under the direction of Jimmie J. Wortman.)

Helene Ann Hilger, Civil Engineering

Charlotte, North Carolina

Dissertation: Methane Oxidation in Landfill Cover Soil. (Under the direction of Morton A. Barlaz.)

Christopher Scott Hofelt, Toxicology

Dallas, Kansas

Dissertation: Use of Artificial Substrates to Monitor Organic Contaminants in the Aquatic Environment. (Under the direction of Damian Shea and Gerald A. LeBlanc.)

Martha Gilliam Hollomon, Chemistry
Cary, North Carolina
Dissertation: Synthesis and Characterization of Oligomeric/Polymeric Assemblies as Organic Based Molecular Magnetic Materials. (Under the direction of David A. Shultz.)

Xiaodong Hong, Marine, Earth and Atmospheric Sciences
Guangdong, People's Republic of China
Dissertation: Numerical Studies of the Air-Sea Interaction Processes in Intense Tropical Systems Using the Coupled Ocean/Atmosphere Mesoscale Prediction System. (Under the direction of Sethu Raman.)

Kimberly Sue Houchens, Textile Technology Management
Rochester, Michigan
Dissertation: Moisture in the Microclimate - and Its Influence on Comfort of Apparel Items. (Under the direction of Roger L. Barker.)

Tammy Lisa Howard, Educational Research and Policy Analysis
Chapel Hill, North Carolina
Dissertation: A Qualitative Study: Teachers' Perceptions of North Carolina's Accountability, Basics and Control Plan. (Under the direction of Robert C. Serow.)

Chang-Chi Hsieh, Mechanical Engineering
Taichung, Taiwan, Republic of China
Dissertation: Development of a 3D Twist Drill Model for AISI 1020 Steel. (Under the direction of John S. Strenkowski.)

Lois Elaine Huffman, Curriculum and Instruction
Ottawa, Ohio
Dissertation: Racial and Ethnic Portrayal in Widely Adopted Reading Methods Textbooks. (Under the direction of Hiller A. Spires.)

Robert Alfred Ihrig, Entomology
Greensboro, North Carolina
Dissertation: Biology and New Management Strategies for the Cereal Leaf Beetle, *Qulema melanopus* (L.), in Winter Wheat in the Coastal Plain Region of North Carolina and Virginia. (Under the direction of Julius R. Bradley, Jr.)

Michael Robert Izquierdo, Electrical Engineering
Cary, North Carolina
Dissertation: Modeling, Transmission and Multiplexing of MPEG VBR Sources over Packet Switched Networks. (Under the direction of Douglas S. Reeves.)

Leslie Fay Jackson, Physiology, Zoology
Cary, North Carolina
Dissertation: Prolactin and Growth Hormone in Temperate Basses (Genus *Morone*): Purification, Characterization, Bioassay and Reproductive Effects *In vivo* and *In vitro*. (Under the direction of Craig V. Sullivan.)

Jason André Janét, Electrical Engineering
Manassas, Virginia
Dissertation: Pattern Analysis, Tracking and Control for Autonomous Vehicles Using Neural Networks. (Under the direction of Mark W. White.)

Jafar Javan, Psychology

Charlotte, North Carolina

Dissertation: Empowerment for Community Development: A Multivariate Framework for Assessing Empowerment at the Community Level. (Under the direction of Frank J. Smith.)

Hao Jin, Marine, Earth and Atmospheric Sciences

Suzhou, People's Republic of China

Dissertation: Regional Ocean-Atmosphere Prediction System (ROAPS) and Its Application to Land-Air-Sea Interaction Processes in the Southeastern United States. (Under the direction of Sethu Raman.)

Ramakrishnan Kalyanaraman, Materials Science and Engineering

Madras, India

Dissertation: Microstructure and Property Correlations in High- T_c Superconductors. (Under the direction of Jagdish Narayan and Jagannadham Kasichainula.)

Hyungsup Kim, Fiber and Polymer Science

Seoul, South Korea

Dissertation: Study of Needlepunching Process and Products. (Under the direction of Abdelfattah M. Seyam.)

Tori Hopper Knight, Economics

Knoxville, Tennessee

Dissertation: The Dynamic Joint Determination of Family Medical Care Use: Theory and Evidence. (Under the direction of Alvin E. Headen, Jr.)

Robert Joseph Kopanic, Jr., Entomology

Belle Vernon, Pennsylvania

Dissertation: Coprophagy in the German Cockroach, *Blattella germanica* (Blattaria: Blattellidae): Adaptive Significance and Role in Horizontal Transfer of Insecticide Baits. (Under the direction of Coby Schal.)

Dorsey Lee Kordick, Comparative Biomedical Sciences

Raleigh, North Carolina

Dissertation: Bartonella Infections in Cats and Dogs. (Under the direction of Edward B. Breitschwerdt and Todd R. Klaenhammer.)

Sreenivas Kota, Civil Engineering

Hyderabad, India

Dissertation: Biodegradation in Contaminated Aquifers: Influence of Microbial Ecology and Iron Bio-availability. (Under the direction of Morton A. Barlaz and Robert C. Borden.)

Julie Ellen Krawetz, Botany

Sunnyvale, California

Dissertation: Functional and Biochemical Characterization of a Maize Ribosome-inactivating Protein (RIP) Zymogen. (Under the direction of Rebecca S. Boston and William F. Thompson.)

David John Lewandowski, Mechanical Engineering

Raleigh, North Carolina

Dissertation: Experimental and Modeled Effects of Camshaft Manufacturing Errors on the Dynamics of High Speed Valve Trains. (Under the direction of Joseph W. David.)

Dong-Feng Li, Economics
Shandong, People's Republic of China
Dissertation: The Effectiveness of Hedging Strategies Using Yield Futures. (Under the direction of Tomislav Vukina and Duncan M. Holthausen, Jr.)

Ying-Hua Liang, Immunology
Jinan, Shandong, People's Republic of China
Dissertation: FIV-induced Cytokine Changes in Brain and Thymus. (Under the direction of Mary B. Tompkins and Lola C. Hudson.)

Erik McKenzie Lowndes, Mechanical Engineering
Raleigh, North Carolina
Dissertation: Development of an Intermediate DOF Vehicle Dynamics Model for Optimal Design Studies. (Under the direction of Joseph W. David.)

Lisa Anne Lucore, Food Science
Worthington, Ohio
Dissertation: Methods Used to Separate and Concentrate Bacteria from Foods. (Under the direction of Lee-Ann Jaykus and Brian W. Sheldon.)

Melanie Lee MacDonald, Microbiology
High Bridge, New Jersey
Dissertation: rRNA Operons of Azotobacteraceae: Organization, Copy Number and Phylogenetics. (Under the direction of Thoyd Melton.)

Cristina Pereira Marques, Forestry
Lisboa, Portugal
Dissertation: Genetic Architecture of Vegetative Propagation Traits in Eucalyptus Hybrids. (Under the direction of Ronald R. Sederoff.)

Marco Antonio Marquez, Chemical Engineering
Caracas, Venezuela
Dissertation: Modeling of Gas-life Reactors: Coupling of Hydrodynamics, Mass Transfer and Chemical Reaction. (Under the direction of George W. Roberts and Ruben G. Carbonell.)

Maura Joan Meade, Plant Pathology
Cranford, New Jersey
Dissertation: Molecular and Biochemical Characterization of the Synthesis of the Polyketides Melanin and Cercosporin in *Cercospora kikuchii*. (Under the direction of R. Gregory Upchurch and Gary A. Payne.)

Surabi Menon, Marine, Earth and Atmospheric Sciences
Bombay, India
Dissertation: Roles of Sulfates in Regional Cloud-Climate Interactions. (Under the direction of Vinod K. Saxena and Roscoe R. Braham.)

Joseph Laurence Miller, Chemistry
Greenville, North Carolina
Dissertation: Mechanistic Studies in Nonaqueous Capillary Electrophoresis Using Acetonitrile-based Media. (Under the direction of Morteza G. Khaleli.)

Kyungjin Min, Electrical Engineering

New York City, New York

Dissertation: Oxide and Nitride Sidewall Spacer Etching Using an ECR Plasma. (Under the direction of John R. Hauser and Jimmie J. Wortman.)

Yoon-Ki Min, Psychology

Daejon, South Korea

Dissertation: An Adjacency Effect in Auditory Space Perception: The Effectiveness of Relative Cues for Exocentric Distance. (Under the direction of Donald H. Mereshon.)

Massoud Mohammadi, Fiber and Polymer Science

Raleigh, North Carolina

Dissertation: Heat Barrier Properties of Heterogeneous Nonwoven Materials. (Under the direction of Pamela Banks-Lee.)

Sutkhet Nakasathien, Crop Science

Bangkok, Thailand

Dissertation: Regulation of Seed Protein Concentration in Soybeans by Supra-optimal Nitrogen Supply. (Under the direction of Richard F. Wilson and Daniel W. Israel.)

Robert Paul Nance, Aerospace Engineering

Salisbury, North Carolina

Dissertation: Closure Models for Transitional Blunt-body Flows. (Under the direction of Hassan A. Hassan.)

Franco Obersnel, Mathematics

Trieste, Italy

Dissertation: On Compactifications of the Set of Natural Numbers and the Half Line. (Under the direction of Gary D. Faulkner.)

James A. Pannucci, Microbiology

Maplewood, New Jersey

Dissertation: Archaeal RNase P RNAs Are Catalytically Active. (Under the direction of James W. Brown.)

Minseo Park, Materials Science and Engineering

Seoul, South Korea

Dissertation: Nitrogen Doping, Optical Characterization and Electron Emission Study of Diamond. (Under the direction of Jerome J. Cuomo.)

Louise Gregory Parks, Toxicology

Lynchburg, Virginia

Dissertation: Altered Elimination of Testosterone Metabolites and Changes in Plasma Vitellogenin Levels as Biomarkers of Exposure to Endocrine Disrupting Compounds. (Under the direction of Gerald A. LeBlanc.)

Virginia Edwards Pirrello, Psychology

Fayetteville, North Carolina

Dissertation: An Empirically Derived Classification System for Adolescent Sex Offenders. (Under the direction of Mary E. Haskett.)

Sridhar Ramesh, Computer Science
Bangalore, India
Dissertation: A Multi-layer Client-server Queueing Network Model with Synchronous and Asynchronous Messages. (Under the direction of Harry G. Perros.)

Charles Lee Ramiller, Electrical Engineering
Cary, North Carolina
Dissertation: Adaptive Fuzzy Control of Temperatures in a Semiconductor Processing Furnace. (Under the direction of Richard T. Kuehn and Mo-Yuen Chow.)

Rona Levetta Reid, Fiber and Polymer Science
Charlotte, North Carolina
Dissertation: Structural Mechanics of Textile Composites: Effect of Braid Construction and Geometric Parameters on Composite Performance. (Under the direction of Aly H. M. El-Shiekh.)

Dina del Carmen Requena, Biological and Agricultural Engineering
Lima, Peru
Dissertation: VIS/NIR Multivariate Spectroscopic Quality Determination of Blue Crab Meat. (Under the direction of S. Andrew Hale and W. Fred McClure.)

Christopher John Roy, Aerospace Engineering
Fayetteville, North Carolina
Dissertation: A Computational Study of Turbulent Reacting Flowfields for Scramjet Applications. (Under the direction of Jack R. Edwards, Jr. and D. Scott McRae.)

Niken Sakuntaladewi, Forestry
Yogyakarta, Indonesia
Dissertation: Indonesia's Village Forestry Development Program: Perspectives on Its Performance. (Under the direction of Frederick W. Cabbage and Jan G. Laarman.)

Rex Henry Schaberg, Forestry
Cary, North Carolina
Dissertation: Integrating Economic Trade-offs with Ecological Possibilities: Citizen Preferences for Ecological Goods and Services from Two Southeastern National Forests. (Under the direction of Robert C. Abt.)

Pamela Dale Schoppee, Physiology
Norfolk, Massachusetts
Dissertation: Relationships of Ovarian Androgens and Estradiol-17 β to Prepubertal Gonadotropin Release, Onset of Puberty and the Somatotrophic Axis in Heifers. (Under the direction of Jeffrey D. Armstrong and Steven P. Washburn.)

Bo-Wen Shen, Marine, Earth and Atmospheric Sciences
Chungli, Taiwan, Republic of China
Dissertation: Inertia Critical Layers and Their Impacts on Nongeostrophic Baroclinic Instability. (Under the direction of Yuh-Lang Lin.)

Jennifer Susan Shoemaker, Genetics
East Aurora, New York
Dissertation: A Bayesian Characterization of Genetic Disequilibria. (Under the direction of Bruce S. Weir.)

James Neal Singletary, Fiber and Polymer Science

Raleigh, North Carolina

Dissertation: Experimental Characterization of the Transverse Compression of Poly(para-phenylene terephthalamide) and Other, Highly Oriented Fibers. (Under the direction of Hawthorne A. Davis and Subhash K. Batra.)

Francisco Skora Neto, Crop Science

Ponta Grossa, Brazil

Dissertation: Efficacy of Glufosinate on Selected Weed Species and Factors Contributing to Its Differential Herbicidal Activity. (Under the direction of Harold D. Coble.)

Robert Merrill Smith, Mechanical Engineering

Raleigh, North Carolina

Dissertation: Real-time Control of Polysilicon Deposition in Single-wafer Rapid Thermal Chemical Vapor Deposition Furnaces. (Under the direction of F. Yates Sorrell, Jr.)

Tonya Smith-Jackson, Psychology

Gaston, North Carolina

Dissertation: Irrelevant Speech, Verbal Task Performance and Focused Attention: A Laboratory Examination of the Performance Dynamics of Open-plan Offices. (Under the direction of Katherine W. Klein.)

Ravi Kant Srivastava, Aerospace Engineering

Springfield, Virginia

Dissertation: An Adaptive Grid Algorithm for Air Quality Modeling. (Under the direction of Fred R. DeJarnette.)

Daniel Marvin Stout II, Entomology

St. Louis, Missouri

Dissertation: The Translocation of Microencapsulated Cyfluthrin and Diazinon Following Perimeter Applications to Dwellings. (Under the direction of Coby Schal and Ross B. Leidy.)

Nathan Haller Taylor, Psychology

Durham, North Carolina

Dissertation: A Process to Implement Health Care Reform in Public Mental Health. (Under the direction of Donald W. Drewes.)

Carrie Jo Thomas, Marine, Earth and Atmospheric Sciences

Raleigh, North Carolina

Dissertation: Individual Deposit-feeder, Community and Ecosystem Level Controls on Organic Matter Diagenesis in Marine Benthic Environments. (Under the direction of Neal E. Blair.)

Aaron Patrick Titus, Physics

Raleigh, North Carolina

Dissertation: Integrating Video and Animation with Physics Problem Solving Exercises on the World Wide Web. (Under the direction of Robert Beichner.)

Chau Minh Tran, Mechanical Engineering

Raeford, North Carolina

Dissertation: A Hybrid Adaptive Feedforward Observer for Virtual Sensing. (Under the direction of Lawrence M. Silverberg.)

- Philomena Marie Wadden, Psychology
Port Morien, Canada
Dissertation: Ability-requirement Factors for Jobs and Job Components: A Comparative Study. (Under the direction of J. William Cunningham.)
- Forbes Robertson Walker, Soil Science
Jedburgh, Scotland
Dissertation: The Effect of Green Manuring and Rock Phosphate Application on Soil Phosphorus in a North Carolina Ultisol. (Under the direction of Larry D. King.)
- Yuzhu Wang, Nuclear Engineering
Huai Lu, People's Republic of China
Dissertation: Mechanical Anisotropy of Zircaloy-4 - Temperature and Strain Rate Effects. (Under the direction of K. Linga Murty.)
- Vicki Berry Ward, Chemistry
Salisbury, Maryland
Dissertation: Nonaqueous Capillary Electrophoresis: Investigation of Efficiency and Laser Induced Fluorescence Detection Limits. (Under the direction of Morteza G. Khaledi.)
- Qiuming Wei, Materials Science and Engineering
Nan-chong City, People's Republic of China
Dissertation: Structure and Properties of *In situ* Self-reinforced Bulk Si_3N_4 Ceramics and Thin Film Diamondlike Carbon Prepared by Pulsed Laser Deposition. (Under the direction of Jagdish Narayan.)
- Anne Victoria Weisbrod, Toxicology
Friday Harbor, Washington
Dissertation: Organochlorine Exposure and Potential Effects in Three Northwest Atlantic Whales. (Under the direction of Damian Shea.)
- Martha Hollowell Welch, Mathematics Education
Snow Hill, North Carolina
Dissertation: Integrating Applications and Algebraic Problem Solving: Development and Evaluation of a Teacher Education Manual. (Under the direction of Larry W. Watson.)
- John Timothy Whitmire, Sociology
Jacksonville, Alabama
Dissertation: The Health Inequality of Labor Markets in the United States: Presenting a Theoretical Model and an Empirical Investigation. (Under the direction of Michael D. Schulman and William B. Clifford II.)
- Vincent Cornelius Wilburn, Electrical Engineering
Macon, Georgia
Dissertation: Efficient Parallel Algorithms for Multiprocessors. (Under the direction of Winsor E. Alexander.)
- Alfred Lee Williams, Chemistry
Vallejo, California
Dissertation: The Synthetic Utility of N-Acyl-2,3-dihydro-4-pyridones in the Synthesis of Alkaloids. (Under the direction of Daniel L. Comins.)

Shawn Robert Wright, Crop Science

Jamestown, New York

Dissertation: Physiological Basis for Competition between Soybean (*Glycine max* (L.) Merr.) and the Competing Weeds, Sicklepod (*Senna obtusifolia* (L.) Irwin and Barneby) and Palmer Amaranth (*Amaranthus palmeri* S. Wats.). (Under the direction of Thomas W. Rufty, Jr. and Harold D. Coble.)

Tracie Lea Rosenbauer Wurm, Psychology

Manitowoc, Wisconsin

Dissertation: Students' Understanding of Learning Disabilities and Their Acceptability Ratings of Special Education Placements. (Under the direction of Ann C. Schulte.)

Hung Xu, Wood and Paper Science

Nanjing, People's Republic of China

Dissertation: Analytical Modeling of Nonlinear Hysteretic Systems. (Under the direction of Bohumil Kasal.)

Hong Yang, Materials Science and Engineering

Nanchang, Jiangxi, People's Republic of China

Dissertation: Mechanical and Thermomechanical Stability Issues on 96.5Sn-3.5Ag Solder Joints in Microelectronic Packages. (Under the direction of K. Linga Murty.)

Ying-Gu Yang, Mechanical Engineering

Taichung, Taiwan, Republic of China

Dissertation: A Modified Adaptive-networks-based Fuzzy Inference Controller. (Under the direction of Gordon K. F. Lee.)

Hong Ying, Electrical Engineering

Anshan, Liaoning, People's Republic of China

Dissertation: In-situ Remote RF Plasma Cleaning and Surface Characterization after SiO₂/Si RIE. (Under the direction of Robert J. Nemanich and John R. Hauser.)

Yue-Mei Zhang, Chemistry

Shanghai, People's Republic of China

Dissertation: Asymmetric Synthesis of Analgesic Benzomorphan Derivatives and Alkaloids via Enantiopure 2,3-Dihydro-4-pyridones as Building Blocks. (Under the direction of Daniel L. Comins.)

1998 GRADUATION ACKNOWLEDGEMENTS

The following non-University organizations have contributed significantly to the success of our graduation exercises.

Sound Systems:

**Mr. Wade C. Miller, Jr., Owner
Sound Engineering, Greensboro, NC**

Floral Designs:

**Johnson-Paschal Floral Co., Inc.
Raleigh, NC**



Agricultural Institute

*College of Agriculture and
Life Sciences*

Thirty-ninth Graduation



*North Carolina State University
Raleigh, North Carolina*

*Jane S. McKimmon Center
December 16, 1998*

AGRICULTURAL INSTITUTE GRADUATION EXERCISES

December 16, 1998

3:00 p.m.

COLLEGE OF AGRICULTURE AND LIFE SCIENCES

NORTH CAROLINA STATE UNIVERSITY

James L. Oblinger, Dean
Presiding

PROCESSIONAL

*INVOCATION Dr. Roger Nix
Director of Missions, Raleigh Baptist Association
Raleigh, North Carolina

ADDRESS Mr. Robert B. Sutter
Chief Executive Officer
North Carolina Peanut Growers Association

AWARDING OF DIPLOMAS Dean James L. Oblinger

Dr. John C. Cornwell
Assistant Director of Academic Programs and
Director of the Agricultural Institute

CONFERRING OF DEGREES Chancellor Marye Anne Fox
North Carolina State University

MOVING OF THE TASSELS Morris Allen Smith
Class Valedictorian

REMARKS Chancellor Marye Anne Fox

STUDENT COMMENCEMENT SPEAKER Morris Allen Smith

*BENEDICTION Dr. Roger Nix

*RECESSIONAL

Reception Immediately Following the Graduation Exercises.

**Please Stand.*

AGRICULTURAL INSTITUTE

PROSPECTIVE GRADUATES

December 16, 1998

ASSOCIATE OF APPLIED SCIENCE IN AGRIBUSINESS MANAGEMENT

	<i>Chad Lee Blake</i>	<i>Troy</i>
H †	<i>Justin Michael Carter</i>	<i>Advance</i>
	<i>Richard Leon Dunn, IV</i>	<i>Creswell</i>
	<i>Brandon Scott Ferguson</i>	<i>Clyde</i>
	<i>Gregory Lee Manning</i>	<i>Nashville</i>
	<i>Thomas Steven McDaniels</i>	<i>Troutman</i>
	<i>Ryan Scott Spratling</i>	<i>Mount Pleasant</i>
H	<i>Scott Winfred Suddreth</i>	<i>Pinehurst</i>
	<i>Kimbrell Clark Williams</i>	<i>Clinton</i>
	<i>Brian McSwain Winstead</i>	<i>Wilmington</i>

ASSOCIATE OF APPLIED SCIENCE IN AGRICULTURAL PEST CONTROL

HH	<i>Donald Keith Cooke, II</i>	<i>Wendell</i>
	<i>Brian Wilson Howard</i>	<i>Harmony</i>

ASSOCIATE OF APPLIED SCIENCE IN FIELD CROPS TECHNOLOGY

‡	<i>Matthew Donald Bowman</i>	<i>Browns Summit</i>
H †	<i>Justin Michael Carter</i>	<i>Advance</i>
	<i>Richard Jason Martin</i>	<i>Wadesboro</i>
	<i>Kenneth Eugene Rudd</i>	<i>Greensboro</i>

ASSOCIATE OF APPLIED SCIENCE IN FOOD PROCESSING, DISTRIBUTION AND SERVICE

<i>Jonathan Talmadge McCain</i>	<i>Sophia</i>
---	---------------

† Co-major

‡ Agribusiness Concentration

H Honors

HH High Honors

ASSOCIATE OF APPLIED SCIENCE IN GENERAL AGRICULTURE

Allen Arthur Hedgecock Kernersville

James Martin Jarvis, Jr. Movock

**ASSOCIATE OF APPLIED SCIENCE IN
LIVESTOCK MANAGEMENT AND TECHNOLOGY
General Livestock Option**

† *Nicholas Ray Head* *Rutherfordton*

Billie Jo Woodie West Jefferson

**ASSOCIATE OF APPLIED SCIENCE IN
LIVESTOCK MANAGEMENT AND TECHNOLOGY
Poultry Option**

Charles Edward Gosforth, III. Kings Mountain

† *Nicholas Ray Head* *Rutherfordton*

† Leon Randal Hendrix Fayetteville

Jeramy Brent Pressley *Monroe*

ASSOCIATE OF APPLIED SCIENCE IN LIVESTOCK MANAGEMENT AND TECHNOLOGY Swine Option

† *Nicholas Ray Head* *Rutherfordton*

† *Leon Randal Hendrix* *Fayetteville*

† Co-major

† Agribusiness Concentration

H Honors

HH High Honors

ASSOCIATE OF APPLIED SCIENCE IN ORNAMENTALS AND LANDSCAPE TECHNOLOGY

	<i>Joseph Mitchell Beck</i>	<i>Zebulon</i>
HH††	<i>Thomas Paul Brooks, Jr.</i>	<i>Raleigh</i>
†	<i>Bradley Shea Davis</i>	<i>High Point</i>
HH †	<i>Eric Adam Goglin</i>	<i>Chagrin Falls, OH</i>
	<i>Jeffrey Brian Jones.</i>	<i>Zebulon</i>
	<i>Patrick Shawn Journigan</i>	<i>Franklinton</i>
	<i>Stephen Coleman Mann</i>	<i>Raleigh</i>
H †	<i>Jason Lloyd Miller</i>	<i>Charlotte</i>
HH ‡	<i>Margaret Mary O'Connor</i>	<i>Clayton</i>
H ‡ †	<i>Suzanne Marie Osborne</i>	<i>Greensboro</i>
HH	<i>Lana Rena Saulmon</i>	<i>Morganton</i>
	† <i>Jason Ryan Stevens</i>	<i>Benson</i>
	<i>Jamie Alan Stroud</i>	<i>Statesville</i>

ASSOCIATE OF APPLIED SCIENCE IN TURFGRASS MANAGEMENT

	<i>Cayle Douglas Aldridge</i>	<i>Cullowhee</i>
	<i>Johnathon David Blomberg</i>	<i>Durham</i>
HH††	<i>Thomas Paul Brooks, Jr.</i>	<i>Raleigh</i>
	<i>Chad Michael Buchman</i>	<i>Raleigh</i>
H	<i>Brandon David Burley</i>	<i>Browns Summit</i>
H	<i>Rupert Bland Eubanks, III</i>	<i>Charlotte</i>
H	<i>Scott Jay Fallon</i>	<i>Charlotte</i>
H	<i>Jerry Michael Flowers</i>	<i>Zebulon</i>
	<i>Michael Scott Freund</i>	<i>Chapel Hill</i>
HH †	<i>Eric Adam Goglin</i>	<i>Chagrin Falls, OH</i>
HH	<i>Brian Ronald Haberstroh</i>	<i>Harrison Township, MI</i>
	<i>Henry Wayland Hicks, III</i>	<i>Candor</i>
	<i>Jeffrey Drew Hillier</i>	<i>Charlotte</i>
	<i>Jeffrey Brian Jones</i>	<i>Zebulon</i>
HH	<i>Robert Grant Leonard</i>	<i>Carrboro</i>
H	<i>Daryl Robert Liles</i>	<i>Knightdale</i>
HH	<i>Derek Wayne Liles</i>	<i>Knightdale</i>
H †	<i>Jason Lloyd Miller</i>	<i>Charlotte</i>
	<i>David Gordon Motes, Jr.</i>	<i>Staunton, VA</i>

H ‡ †	<i>Suzanne Marie Osborne</i>	<i>Greensboro</i>
HH	<i>Robert Allan Ostman</i>	<i>Lunenburg, MA</i>
H	<i>Matthew Calvin Parrish</i>	<i>Garner</i>
HH	<i>Scott Ernest Pollard</i>	<i>Cary</i>
HH	<i>Jonathan Marc Santana</i>	<i>Raleigh</i>
	<i>Perry Eugene Smart, III</i>	<i>Wallingford, CT</i>
HH	<i>Morris Allen Smith</i>	<i>Wake Forest</i>
	<i>Nathan Hanson Smith</i>	<i>Charlotte</i>
	‡ † <i>Michael Brent Webb</i>	<i>Wilson</i>
H	<i>William Shad Wilson</i>	<i>Durham</i>
HH	<i>Robert Francis Yarish</i>	<i>Raleigh</i>

Academic Honors

Students with a grade point average of 3.00-3.49 graduate with **Honors**. Students with a grade point average of 3.50-4.00 graduate with **High Honors**.

† Co-major	H Honors
‡ Agribusiness Concentration	HH High Honors

Academic Costume

Academic gowns represent a tradition handed down from the universities of the Middle Ages. These institutions were founded by the Church; the students, being clerics, were obliged to wear the prescribed gowns at all times. Round caps later became square mortarboards; the hoods, originally cowls attached to the gowns, could be slipped over the head for warmth.

Many European universities have distinctive caps and gowns which are different from those commonly used in this country. Some of the gowns are of bright colors and some are embellished with fur. A number of these may be noted in the procession.

The usual color for academic gowns in the United States is black. The bachelor's gown is worn closed, the master's and doctor's may be worn open or closed. The shape of the sleeve is the distinguishing mark of the gown: bachelor--long pointed sleeves; master--oblong, square cut in the back with an arc away in front; doctor--bell shaped.

Caps are black. The tassels for the Ph.D. degree are gold and those for other graduate and professional degrees may be of the color corresponding to the trimmings on the hoods. The color of the tassels for bachelor's degree indicates the curriculum of the graduate: Agriculture, maize; Design, brown; Education, light blue; Engineering, orange; Forest Resource, russet; Liberal Arts, white; Physical and Mathematical Sciences, yellow; Textiles, wine red.

Of all the components of the academic costume, the hood bears the heaviest symbolic burden. The hood must make clear the level of the degree, the faculty in which it was given, and the institution which awarded it. The level of the degree is shown by the size of the hood, the width of the velvet trimmings, and in the case of doctors, by the shape. The bachelor's, master's, and doctor's hoods are three feet, three and one-half feet, and four feet long respectively. The velvet trimming in the same order is two, three, and five inches and extends all around the hood on the exposed edge. This same trimming identifies the faculty. A partial list of the colors follows: Agriculture, maize; Architecture and Art, brown; Science, golden yellow; Economics, copper; Education, light blue; Engineering, orange; Forestry, russet; Physical Education, sage green; Religion, scarlet; Speech, silver gray; Veterinary Medicine, gray; Textiles, wine red. The following faculties have the same color--dark blue: Anthropology, History, Languages, Literature, Philosophy, Political Science, Sociology.



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